METCALF AND EDDY INC BOSTON MASS
WASTEWATER ENGINEERING AND MANAGEMENT PLAN FOR BOSTON HARBOR - --ETC(U)
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# WASTEWATER ENGINEERING AND MANAGEMENT PLAN



FOR

BOSTON HARBOR - EASTERN MASSACHUSETTS METROPOLITAN AREA

EMMA STUDY

TECHNICAL DATA VOL. 9

MDC INTERCEPTOR AND PUMPING

STATION ANALYSIS AND IMPROVEMENTS



OCTOBER 1975

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#### COVER PHOTOGRAPH

The cover photograph on this Technical Data Volume depicts the front of the Alewife Brook Pumping Station. This photograph was taken in the late 1800's.

WASTEWATER ENGINEERING AND MANAGEMENT PLAN FOR

BOSTON HARBOR — EASTERN MASSACHUSETTS METROPOLITAN AREA EMMA STUDY

TECHNICAL DATA VOLUME 9.

MDC INTERCEPTOR AND PUMPING STATIONS
ANALYSIS AND IMPROVEMENTS

FOR THE

METROPOLITAN DISTRICT COMMISSION

**COMMONWEALTH OF MASSACHUSETTS** 

BY

METCALF & EDDY, INC.

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REPORT

#### CHAPTER 1

#### INTRODUCTION

Purpose/

The purpose of this technical data volume is to present the inventory and evaluation of the MDC interceptors, pumping stations and headworks in terms of their adequacy to meet projected needs under various concepts and the recommended plan, and to recommend the general upgrading required at the pumping stations and headworks.

# Scope

This volume presents the details of the MDC interceptor system, including an updated interceptor map. Preliminary relief sizes and costs of sewers needed under each concept and the recommended plan are presented. For pumping stations and headworks the findings from inspections of each are presented along with preliminary estimates needed for their upgrading to up-to-date standards.

The interceptor system was evaluated through computer modeling of the MDC sewers for purposes of determining their hydraulic adequacy to transport projected flows. This included description of the pipe system in detail along with identification of areas tributary to each pipe through the evaluation of local sewer systems.

In the case of pumping stations and headworks, each major piece of equipment was inventoried. Supervisory and operating personnel were consulted as an aid in ascertaining the work required to rehabilitate each facility. An analysis was then made to determine the modifications required to ensure each facility would meet future capacity requirements by accepted engineering standards.

#### Report Structure

As shown on the inside cover, the study results are presented in a series of volumes. The criteria used in quantifying the various improvements needed are presented in Technical Data Vol. 1 and 2. The description of the service area configurations used in each concept investigated is presented in Technical Data Vol. 4 and 5. The recommended plan and program for its implementation is presented in Technical Data Vol. 15.

This report is Technical Data Vol. 9, MDC Interceptor and Pumping Station Analysis and Improvements, and covers the evaluation of the adequacy and determination of the needed improvements for the sewers and pumping stations of the MDC. First, this volume describes the existing system; then, interceptor relief requirements are shown and finally, an evaluation of the upgrading requirements for pumping stations and headworks is presented.

Appendixes to this report cover details of the interceptors, pumping stations and headworks facilities. Due to the nature and length of the pumping station and headworks inventories, they have not been included in all copies of the report. However, for those interested in these details, a copy of these inventories is available for review at the Metropolitan District Commission.

#### CHAPTER 2

#### EXISTING SYSTEM

#### General

The MDC sewerage system, called the Metropolitan Sewerage District (MSD), includes treatment plants in Boston Harbor at Deer Island and Nut Island serving respectively the North Metropolitan and South Metropolitan sewerage systems. The MSD includes areas shown on Figure 2-1. Four headworks, 12 pumping stations and interceptors totalling 225 miles presently serve 42 communities including the City of Boston. The MSD has 43 member communities, all of which contribute flow except for Holbrook. Also, the MSD presently operates combined sewer overflow control facilities in Cambridge and Somerville. These, however, are discussed in Technical Data Vol. 7, Combined Sewer Overflow Regulation.

The total area and population served by the MSD is presently 132,800 acres and 1,970,300, respectively.

Figure 2-2 (bound in back) shows the approximate location, size and extent of the existing MDC interceptor system. Shown are the overall size of the various reaches, selected invert elevations (MDC Datum) and the MDC Section Number under which detailed construction records are filed. Details of each pipe are listed in Appendix A.

#### North Metropolitan Sewerage System

About 68,200 acres and about 1,340,200 persons plus nondomestic contributions are served by the Deer Island Treatment Plant. This includes 22 communities plus parts of Boston, Brookline, Milton and Newton. Table 2-1 summarizes the communities, population and areas served by this system.

A description of the function of various interceptor facilities of this system is presented in Table 2-2. The percentages of communities discharging to the various interceptors shown is on the basis of percent of total area sewered.

Seven of the 12 total MDC pumping stations are in the North Metropolitan System. These are the Alewife Brook, Charlestown, East Boston Electric, East Boston Steam and Reading. The Old Deer Island and Winthrop

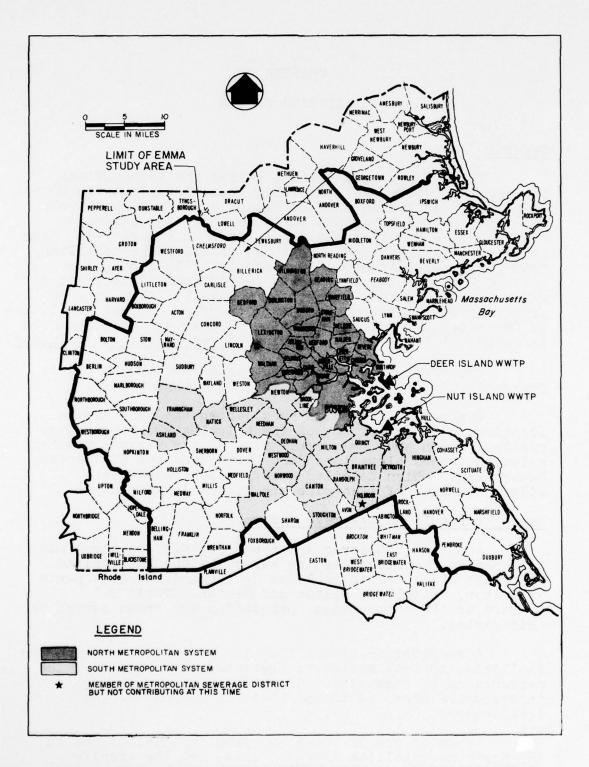


FIG. 2-1 AREAS SERVED BY THE EXISTING METROPOLITAN INTERCEPTOR SYSTEMS AND THE DEER AND NUT ISLAND WASTEWATER TREATMENT PLANTS

TABLE 2-1. EXISTING NORTH METROPOLITAN SEWERAGE SYSTEM (DEER ISLAND) SERVICE AREA

	Community	Sewered	Sewered	
Numbe:	r Name	population	acres	
2 57 157 18 22 343 48 557 66 77 88 89 97 109 110 112 113 114 115	Arlington Bedford Belmont Brookline (part) Burlington Cambridge Chelsea Everett Lexington Malden Medford Melrose Milton (part) Newton (part) Reading Revere Somerville Stoneham Wakefield Waltham Watertown Wilmington Winchester Winthrop Woburn Boston Proper - Brighton - Charlestown - Dorchester	population  53,600 6,100 24,400 30,700 10,800 10,400 3c,600 42,500 24,600 56,100 63,800 33,200 4,900 41,100 13,500 40,600 88,700 19,700 22,400 46,200 39,300 20,300 27,700 67,100 63,600 15,400 112,100	3,000 1,400 2,000 860 3,900 3,400 1,300 4,400 2,600 2,750 2,000 2,300 4,120 2,100 1,800 2,300 1,900 2,250 4,300 2,100 1,480 2,100 1,480 1,990 2,900	
	otal	1,340,200	68,230	

TABLE 2-2. DESCRIPTION OF NORTH METROPOLITAN SEWERAGE SYSTEM

to	EXPERIMENTAL A				CS . 43-5 X35A
Discharges sewage flows t	- Boston Harbor through outfalls	- Deer Island Treatment Facilities	- Deer Island Treatment Facilities	- Deer Island Treatment Facilities	- Boston Main Drainage Tunnel
Receives sewage flows from	- Boston Main Drainage Tunnel - North Metropolitan Relief Tunnel - North Metropolitan Sewer below East Boston Pump Station (steam)	- Ward Street Headworks	- Chelsea Creek Headworks	- Overflow from Chelsea Creek Headworks via East Boston Steam & East Boston Electric stations - 100 percent of East Boston via East Boston Steam Station - 100 percent of Winthrop	<ul> <li>100 percent South Boston via South Boston Inter-ceptor and Boston Main Interceptor</li> <li>100 percent of Dorchester (north) via Dorchester Interceptor</li> </ul>
Sewerage facility(1) Receiv	Deer Island Treatment Facilities	Boston Main Drainage Tunnel	North Metropolitan Relief Tunnel	North Metropolitan Sewer - below East Boston Pump Station (steam) (Sections 3-1/2, 4 through 9)	Columbus Park Headworks -
No.	н	8	m	<i>⇒</i>	10

TABLE 2-2 (Continued). DESCRIPTION OF NORTH METROPOLITAN SEWERAGE SYSTEM

rage facility(1) Receives sewage flows from Discharges sewage flows to	<pre>Columbus Park Headworks - 100 percent of Boston Main</pre>	treet Headworks - South Charles Sewer - Boston Main Drainage (Charles River Valley Tunnel Sewer) - South Charles Relief Sewer - Boston Main Drainage Relief Sewer - About 10 percent of Roxbury	creek Headworks - Revere Branch Sewer (Sections 61 and 62) - Chelsea Branch Sewer (Sections 11, 56, 57, and 57A) - North Metropolitan Relief Sewer - North Metropolitan Sewer in Chelsea	Station Electric - Excess overflow from - North Metropolitan Sewer Chelsea Creek Headworks below East Boston Steam via 2-60 in. siphons - Overflows to Chelsea Creek
Sewerage fa	Columbus Park (continued)	Ward Street H	Chelsea Creek Headw	East Boston Electri Pump Station
No.	r.	9 2 <b>-</b> 5	_	ω

TABLE 2-2 (Continued). DESCRIPTION OF NORTH METROPOLITAN SEWERAGE SYSTEM

rges sewage flows to	Chelsea Creek Headworks	Chelsea Creek Headworks	sea Creek Headworks	sea Creek Headworks	Charlestown Pump Station
Discharges			Chelsea	- Chelsea	
Receives sewage flows from I	- About 25 percent of Chelsea - - About 10 percent of Revere - About 5 percent of Everett	- About 90 percent Revere - About 15 percent Chelsea	- Cambridge Branch Sewer via Charlestown Pump Station - North Metropolitan Sewer above Cambridge Branch Sewer Intersection (Section 16) - About 30 percent of Everett - About 60 percent of Chelsea	- North Metropolitan Relief Sewer above overflow connection from North Metropolitan Sewer (Section 17) - Overflows from North Metropolitan Sewer at Section 17 intersection	<ul> <li>Somerville-Medford Branch</li> <li>Sewer</li> <li>Charlestown Branch Sewer</li> <li>About 60 percent of Somerville</li> <li>About 20 percent of Cambridge</li> </ul>
Sewerage facility(1)	Chelsea Branch Sewer (Sections 11, 56, 57, and 57A)	Revere Branch Sewer (Sections 61 and 62)	North Metropolitan Sewer - in Chelsea (Sections 12, 14 through- 16, and 23 through 25)	North Metropolitan Relief Sewer (Sections 102 and 103, 104A, 104B, 105)	Cambridge Branch Sewer (Sections 25, 25-1/2, 26 through 28)
No.	6	10	11	12	13

TABLE 2-2 (Continued). DESCRIPTION OF NORTH METROPOLITAN SEWERAGE SYSTEM

	יייייייייייייייייייייייייייייייייייייי		
No.	Sewerage facility(1)	Receives sewage flows from	Discharges sewage flows to
14	North Metropolitan Sewer above Cambridge Branch Sewer Intersection (Sections 16 and 17)	- North Metropolitan Sewer above Wakefield Trunk Sewer connection - Wakefield Trunk Sewer (Section 40 below Section 95) - About 45 percent of Everett	- North Metropolitan Sewer below Cambridge Branch Sewer connection - Overflows to North Metropolitan Relief Sewer (Section 105)
ST 2-7	North Metropolitan Sewer above overflow connection from North Metropolitan Sewer (Section 17)	- North Metropolitan Sewer (Section 21) - North Metropolitan Relief Sewer (Section 108) above intersection with North Metropolitan Sewer (Section 21) - Wakefield Branch Relief Sewer (Section 87) - Alewife Brook Conduit (force main)	- North Metropolitan Relief Sewer below overflow connection from Section 17 - Overflows to North Metropolitan Sewer (Section 21)
16	Somerville-Medford Branch Sewer (Section 35)	- About 35 percent of 5) Somerville - About 20 percent of Medford	<ul> <li>Cambridge Branch Sewer</li> <li>Combined Sewage overflows</li> <li>to Somerville Detention</li> <li>and Chlorination Facility</li> </ul>
17	Charlestown Branch Sewer	Sewer - 100 percent of Charlestown	- Cambridge Branch Sewer

TABLE 2-2 (Continued). DESCRIPTION OF NORTH METROPOLITAN SEWERAGE SYSTEM

	Cowanage facility	Benefives sewage flows from	Dischances sewage flows to
		SCWARC ITOWS	Sewage Hous
3	Wakefield Trunk Sewer (Section 40 below Section 95A)	- Malden Relief Sewer (Section 95) - Overflow from Wakefield Branch Relief Sewer (Section 87)	- North Metropolitan Sewer (Section 17)
3	Wakefield Branch Relief Sewer (Section 87, 64, 58, 59, and 60)	- About 80 percent of Wakefield - About 35 percent of Melrose - Malden Relief Sewer (Section 95A)	- North Metropolitan Relief Sewer (Section 105) e - Overflow to Wakefield Trunk Sewer (Section 40)
Σ	Malden Relief Sewer (Section 95)	- About 30 percent of Malden - Overflow from Bryant Street Sewers - Overflow from Malden Branch Sewer (Section 54)	- Wakefield Trunk Sewer t (Section 40) h
Σ	Malden Relief Sewer (Section 95A)	- Wakefield Trunk Sewer (Section 40 above section 95A)	- Wakefield Branch Relief Sewer (Section 87)
3	Wakefield Trunk Sewer above Section 95A (Section 41, 49, and 50)	- Malden Branch Sewer (Section 54) - About 65 percent of Melrose - About 20 percent of Wakefield - About 15 percent of Stoneham - About 5 percent of Malden	- Malden Relief Sewer (Section 95A)

TABLE 2-2 (Continued). DESCRIPTION OF NORTH METROPOLITAN SEWERAGE SYSTEM

	- 1		
No.	Sewerage facility(1)	Receives sewage flows from	Discharges sewage flows to
53	Malden Branch Sewers (Section 54, 55, 65, and 66)	- About 40 percent of Malden - About 10 percent of Everett	<ul> <li>wakefield Trunk Sewer above Section 95A</li> <li>Overflow to Malden Relief Sewer (Section 95)</li> <li>Intersection with 54</li> <li>Overflow to Malden Relief Sewer from Bryant Street Sewers.</li> </ul>
2-9	North Metropolitan Sewer above Wakefield Trunk Sewer (Section 40) connection (Section 17-1/2, 19, 20, and 21)	- Overflows from North Metropolitan Relief Sewer (Section 108) - About 60 percent of Medford - About 20 percent of Malden	- North Metropolitan Sewer (Section 17)
25	Alewife Brook Conduit (force main below pump station) Alewife Brook Sewer (Section 43-1/2)	- Alewife Brook Pump Station - Excess flow from Alewife Brook Pump Station	<ul> <li>North Metropolitan Relief</li> <li>Sewer (Section 108)</li> <li>North Metropolitan Sewer</li> <li>(Section 21)</li> </ul>
27	Alewife Brook Pump Station	<ul> <li>Lexington Branch Sewer</li> <li>(Section 52)</li> <li>Alewife Brook Conduit</li> <li>Alewife Brook Sewer</li> <li>(Section 43)</li> </ul>	- Alewife Brook Conduit (force main) - Alewife Brook Sewer (Section 43-1/2) - Overflow to Alewife Brook
28	Alewife Brook Conduit	- Alewife Brook Conduit, Belmont Branch - Belmont Branch Sewer (Section 81)	- Alewife Brook Pump Station

DESCRIPTION OF NORTH METROPOLITAN SEWERAGE SYSTEM
I METROPOLITAN
OF NORTH
DESCRIPTION
(Continued).
TABLE 2-2 (

Alewife Brook Sewer - About 20 percent of - Alewife Gambridge - About 10 percent of Brook Cambridge - About 5 percent of Brook Cambridge - About 1 percent of Cambridge - About 4 percent of Cambridge - About 5 percent of Cambridge - About 7 percent of Cambridge - About 7 percent of Cambridge - Alewife Cambridge - North Metropolitan Sewer (Section 77 via Section Metropolitan Sewer (Section 111) - North Metropolitan Relief - Overflow Sewer (Section 21) - North Metropolitan Relief - Overflow Sewer (Section 111)	nt had de	Receives sewage flows from  - About 5 percent of	Sewerage facility(1)  Alewife Brook Conduit (continued)  Alewife Brook Sewer (Section 43)  Alewife Brook Conduit Belmont Branch Belmont Branch (Section 81)  North Metropolitan Relief Sewer (Section 108) above inter- section with North Metropolitan Sewer (Section 21)  New Mystic Valley Sewer	No. 28 30 31 32 33
North Metropolitan - New Mystic Valley Sewer - N	ı	- New Mystic Valley Sewer	North Metropolitan	32
Belmont Branch Sewer - About 4 percent of - Alewife	- Alewife Brook Conduit	- About 4 percent of	Belmont Branch Sewer	31
Alewife Brook Conduit - About 90 percent of Belmont - Belmont Branch - About 1 percent of Cambridge	<pre>lmont - Alewife Brook Conduit pridge</pre>	90 percent 1 percent	Alewife Brook Conduit Belmont Branch	30
Alewife Brook Sewer - About 20 percent of - Alewife (Section 43) - Arlington - About 10 percent of - Overflow Cambridge - About 5 percent of - About 5 percent of Somerville	4 O	- About 20 percent of Arlington - About 10 percent of Cambridge - About 5 percent of Somerville	Alewife Brook Sewer (Section 43)	53
	13)	- About 5 percent of Cambridge - Overflows from Alewife Brook Sewer (Section 4	Alewife Brook Conduit (continued)	28
Alewife Brook Conduit - About 5 percent of (continued) - Overflows from Alewife Brook Sewer (Section 43)	Discharges	sewage flows	1 1	No.

TABLE 2-2 (Continued). DESCRIPTION OF NORTH METROPOLITAN SEWERAGE SYSTEM

Sewerage facility(1) Receives sewage flows from Discharges sewage flows to	<pre>ystic Valley Sewer - About 40 percent of tinued) - About 25 percent of Woburn</pre>	orth Metropolitan - Millbrook Valley Relief - North Metropolitan Relief Relief Sewer (Section 91A) Sewer (Section 108)  115A below bypass - Overflows from New Mystic - Overflows to North Chamber to 111) - North Metropolitan Sewer (Section 45) - Bypass and Regulator Chamber in Woburn - About 5 percent of Winchester	Millbrook Valley Relief - Overflows from Millbrook - North Metropolitan Relief Sewer (Sections 93, 92, Valley Sewer (Sections 84, Sewer (Section 111) 83, and 80)  - Overflows from Lexington Branch Sewer (Sections 53 and 52)  - North Metropolitan Sewer (Section 22 above Section 91A)  - About 20 percent of
Sewerage fac	New Mystic Valley (continued)	North Metropolitan Relief Sewer (Sec 115A below bypass chamber to 111)	Millbrook Valle Sewer (Section 91B, and 91A)
No.	33	34	35

TABLE 2-2 (Continued). DESCRIPTION OF NORTH METROPOLITAN SEWERAGE SYSTEM

TABLE 2-2 (Continued). DESCRIPTION OF NORTH METROPOLITAN SEWERAGE SYSTEM

TABLE 2-2 (Continued). DESCRIPTION OF NORTH METROPOLITAN SEWERAGE SYSTEM

Receives sewage flows from Discharges sewage flows to	- 100 percent of Reading - Bypass chamber in Woburn (Section 115A) - About 10 percent of politan Relief Sewer (Section 115B) - Overflow to North Metropolital Control (Section 115B) - Overflow to North Metropolitan Sewer (Section 46)	- Overflows from Reading - Bypass chamber (Section Extension Sewer (Section 115A) 75) - About 30 percent of Stoneham - About 15 percent of Woburn	- Overflows from Reading - Bypass chamber Extension Sewer (Section (Section 115A) 73) - About 25 percent of Stoneham - About 5 percent of Woburn	- North Charles Relief Sewer - Ward Street Headworks - South Charles Relief Sewer above Charles River crossing - Overflows from South Charles Sewer below Charles River crossing	- Overflows from South Charles- South Charles Relief Sewer Sewer - About 60 percent of crossing Combined sewage overflows to BU detention and chlorination facility
Sewerage facility(1)	Reading Extension Sewer (Section 72 above bypass chamber to 76)	North Metropolitan Relief Sewer (Sections 115B and 115A above bypass chamber)	North Metropolitan Sewer (Section 46 above bypass chamber)	South Charles Relief Sewer below Charles River crossing (Sections 5 and CRC)	South Charles Relief Sewer above Charles River crossing (Sections 1 through 4)
No.	45	46	47	148	64

TABLE 2-2 (Continued). DESCRIPTION OF NORTH METROPOLITAN SEWERAGE SYSTEM

No.	Sewerage facility(1)	Receives sewage flows from I	Discharges sewage flows to
20	South Charles Sewer (Charles River Valley Sewer) (Sections A through H and 4A)	- 100 percent of Waltham - 100 percent of Newton (north) - 100 percent of Brighton - 100 percent of Brookline (north) - About 40 percent of Watertown - About 20 percent of Roxbury	Ward Street Headworks Overflows to South Charles Relief Sewer Combined sewage overflows to BU detention and chlorination facility via 54 in, Charles River Crossing
[5 2 <b>-1</b> 5	North Charles Relief Sewer (Sections 207A and 207b)	- All flows and overflows from North Charles Metropolitan Sewer	South Charles Relief Sewer below Charles River crossing. Combined sewage overflows to BU chlorination and detention facility
52	North Charles Metro- politan Sewer (Sections 209, 29 and 30, and 63)	- About 60 percent of Cambridge - About 10 percent of Belmont -	<ul> <li>North Charles Relief</li> <li>Sewer at BU facility</li> <li>Overflows to North Charles</li> <li>Relief Sewer</li> </ul>
23	Boston Main Interceptor	- 100 percent of Boston propervia East and West Side Interceptors(2) - 100 percent of Fenway- Jamaica and about 60 percent of Roxbury via Stony Brook Interceptor.(2)	Columbus Park Headworks Overflows to Ward Street Headworks via Boston Main Drainage Relief.

pumping stations are in existence but are no longer in active use. The Deer Island Pumping Station is being phased out of the system now that flows are being diverted directly to the Winthrop Terminal Facility. Flows tributary to the Winthrop Pumping Station now enter the MDC North Metropolitan Sewer by gravity since most of the flows tributary to this sewer have been diverted to the North Metropolitan Relief Tunnel.

All four headworks, namely Chelsea Creek, Columbus Park, Ward Street and Winthrop Terminal Facility are also part of the North Metropolitan Sewerage System.

## South Metropolitan Sewerage System

An estimated 64,600 acres are sewered in the area tributary to this system serving about 630,200 persons, plus nonresidential contributors.

Wastewater from 16 communities plus parts of Boston, Brookline, Milton and Newton flows to the Nut Island Treatment Plant as shown in Table 2-3.

The interrelationship and function of the South Metropolitan System interceptors is shown in Table 2-4.

The remaining five pumping stations of the MSD are the Braintree-Weymouth, Hingham, Quincy, Houghs Neck and Squantum pumping stations.

TABLE 2-3. EXISTING SOUTH METROPOLITAN SEWERAGE SYSTEM (NUT ISLAND) SERVICE AREA

	Community	Sewered	Sewered
Number	Name	population	acres
3	Ashland	1,100	250
3 14	Braintree	34,400	4,400
16	Brookline (part)	27,500	2,330
19	Canton	8,900	1,650
26	Dedham	23,800	2,700
31	Framingham	50,600	7,000
36	Hingham	3,800	650
37	Holbrook(1)	0	0
37 62	Milton (part)	20,700	2,510
64	Natick	21,400	3,800
65	Needham	25,500	3,600
67	Newton (part)	50,000	6,260
72	Norwood	30,500	3,200
75	Quincy	88,000	5,250
76	Randolph	13,500	1,800
89	Stoughton	5,600	1,000
96	Walpole	5,800	1,100
100	Wellesley	22,700	6,200
105	Westwood	4,300	600
106	Weymouth	27,800	3,050
	Boston		
116	Dorchester	25,700	410
119	FNWY-JMACA	10,000	490
120	Hyde Park	38,300	2,660
121	Mattapan(2) Roslindale(2)	37,200	960
122		28,200	1,300
125	West Roxbury	25,000	1,450
Tot	al	630,200	64,620

Presently not served by the MDC.
 Negligible areas of Mattapan and Roslindale that contribute to the Deer Island Treatment Plant are considered tributary to the Nut Island Treatment Plant.

DESCRIPTION OF SOUTH METROPOLITAN SEWERAGE SYSTEM TABLE 2-4.

No.

2

Discharges sewage flows to	- Ocean through outfalls	- Nut Island Treatment Plant	
Receives sewage flows from	- High level sewer	- Houghs Neck Pump Station - Braintree-Weymouth Pump Station - Squantum Pump Station - New Neponset Valley sewer - Neponset Valley sewer - Wellesley extension relief sewer - 100 percent of Mattapan (south) - 100 percent of Dorchester (south) - 100 percent of Sewer - 100 percent of Penway- Jamaica (south) - Approximately 90 percent of Hyde Park - Approximately 15 percent of West Roxbury - Approximately 13 percent of Quincy - Approximately 13 percent	(
Sewerage facility	Nut Island Treatment Plant	High level sewer (Sections 45 through 75)	

TABLE 2-4 (Continued). DESCRIPTION OF SOUTH METROPOLITAN SEWERAGE SYSTEM

TABLE 2-4 (Continued). DESCRIPTION OF SOUTH METROPOLITAN SEWERAGE SYSTEM

No.	Sewerage facility	Receives sewage flows from	Discharges sewage flows to
ω	Stoughton extension sewer (Sections 119 through 121)	- 100 percent of Stoughton - About 60 percent of Canton	- New Neponset Valley sewer
6	Neponset Valley sewer (Sections 15 through 26)	<ul> <li>Wellesley extension sewer</li> <li>Upper Neponset Valley sewer</li> <li>Approximately 50 percent</li> <li>Of Dedham</li> <li>Approximately 75 percent</li> <li>Of Hyde Park</li> <li>Approximately 15 percent</li> <li>Of West Roxbury</li> </ul>	- High level sewer
10	Wellesley extension relief sewer (Sections 138, and 129 through 131)	- Framingham extension sewer - Overflow from Wellesley extension sewer - Overflow from Upper Neponset Valley sewer	- High level sewer
11	Brighton Branch sewer (Sections 80 through 87)	- Approximately 75 percent of Brookline (south) - Approximately 86 percent of Newton (south)	- High level sewer
12	Framingham extension sewer (Sections 132, 133B, and 134)	<ul> <li>100 percent of Ashland</li> <li>100 percent of Framingham</li> <li>100 percent of Natick</li> <li>Overflow from Wellesley</li> <li>connection (Section 106)</li> </ul>	- Wellesley extension relief sewer

TABLE 2-4 (Continued). DESCRIPTION OF SOUTH METROPOLITAN SEWERAGE SYSTEM

No.	Sewerage facility	Receives sewage flows from	Discharges sewage flows to
13	Wellesley extension sewer (Sections 98 through 106)	- 100 percent of Wellesley - 100 percent of Needham - Approximately 40 percent of Dedham	<ul> <li>Overflow to Framingham extension at Wellesley connection</li> <li>Overflow to Wellesley extension relief sewer</li> <li>Neponset Valley sewer</li> </ul>
77	Upper Neponset Valley sewer (Section 27 through 30)	- Approximately 25 percent of Brookline (south) - Approximately 14 percent of Newton (south) - Approximately 70 percent of West Roxbury - Approximately 10 percent of Roslindale (south)	- Neponset Valley sewer - Overflow to Wellesley extension relief sewer
15	Houghs Neck Pump Station and force main	- Approximately 2 percent of Quincy	- High level sewer
16	Braintree-Weymouth Pump Station and force main	- Braintree-Weymouth extension - High level sewer	- High level sewer
17	Squantum Pump Station and force main	- Approximately 10 percent of Quincy	- High level sewer
18	Hingham Pump Station and force main	- 100 percent of Hingham	- Braintree-Weymouth extension sewer
19	Quincy Pump Station and force mains	- Approximately 60 percent of Quincy	- High level sewer

#### CHAPTER 3

#### EVALUATION PROCEDURE

#### General

In the past, the procedure in sizing interceptors and pumping stations has been to design on the basis of peak dry weather flows, plus an allowance for stormwater inflow, where combined sewers were tributary to the interceptor under design. In the latter case, various criteria were used, but generally a factor of three times average dry weather flow was employed as the basis for design.

Since this procedure is no longer acceptable to achieving water pollution control for combined sewers, other means for controlling combined sewer overflows have been evaluated apart from intercepting additional flows. On this basis, the adequacy of interceptors and pumping stations is measured on the basis of peak dry weather flow capacity with combined sewer overflows being evaluated explicitly for remedial action in Technical Data Vol. 7.

# Interceptors

The hydraulic capacity and relief requirements of the interceptors was determined through computer modeling.

The model carries out hydraulic gradient calculations and consists of an Executive Block, two Main Programs (one for Subcritical Flows and the other for Supercritical Flows in the system), and a number of subprograms for computational support for the main programs. Each subprogram is written to do some computational functions. As for example, there are subprograms to calculate flow properties and head losses in conduits, bends, transitions, siphons, etc.

The model identifies each sewer element separately, calculates critical slope, normal depth and full flow capacity, and the hydraulic and energy gradients under the modeled flow condition. A description of the model used is presented in Appendix B.

In preparing the model of the MDC Interceptors, the physical properties of each section of the interceptor system were collected by going through MDC files and construction drawings. All information regarding how the

various interceptors are connected was also collected. Any modifications to the interceptor system that were made after they were built were also included. An updated interceptor data base and map was prepared showing all present interceptors and the communities that presently contribute sewage flows to the system.

Following completion of the interceptor map, the next step was to determine the quantity of average and peak sewage flows that each section of the interceptor system needs to carry.

This was done by first identifying how sewage from each community flows into the MDC interceptor system. This led to the identification of tributary areas for each interceptor in the system as shown in Tables 2-2 and 2-4. Average and peak flows in each interceptor were then calculated based on the areas contributing to that section, population served, and major and minor industrial flows (see Technical Data Vol. 2, Engineering Criteria). flows in each sewer section were estimated, modeling started at the downstream terminal point in the interceptor. Hydraulic analysis then proceeded in an upstream direction. Appendix C presents the program instructions for the interceptor analysis while Appendix D presents an example of how this interceptor modeling was conducted including inputs to the model and results from using the model.

Analysis of the interceptor system was initially done using estimated peak present design flows. In this analysis, the model output provided capacities for each interceptor and pinpointed all sections requiring immediate relief. During the modeling of the interceptor system, it was noted that many of the interceptor shapes were other than circular or prismatic, such as horse-shoe, egg, etc. There appeared to be no standard depth to width ratio. Accordingly, these sections were converted to equivalent circular sections in the model.

Interceptor adequacy was tested against 1970, 1980, 2000, 2020 and 2050 design flows. Wherever the 1970 or 1980 flows showed lack of adequate capacity, need for immediate relief was identified and sized on the basis of year 2020 design flows. Where such were found to be adequate for the year 2000 flows, relief was sized to meet year 2050 needs and was indicated as requiring future relief.

# Pumping Stations and Headworks

In this investigation peak dry weather flows estimated to occur by the year 2000 were used to ascertain

the capacity required to meet future needs. A design period of 20 years was used for pumping stations and headwork facilities which if properly designed are easily expanded.

It should be noted that the future capacity requirements are based on projected dry weather flows, and do not provide for excessive inflows into the sewerage systems. Since inflows do occur, detailed investigations will be required to determine if areas of storm inflow can be isolated, and inflows effectively reduced. If substantial corrections cannot be made, then it will be necessary to increase the pumping capacity accordingly.

Particular effort was made to ascertain those modifications that would be required so that each facility would conform to sound and accepted engineering standards. Attention was given to the age, type and condition of the installed equipment in each facility in determining the continued use of such equipment to provide for future needs.

In order to achieve this, field inspection of each major facility was conducted and an inventory of each major piece of equipment was made and is presented in Appendixes F and G.

In all cases, it has been assumed and recommended that all pumping stations will be electrified, and designed for at least automatic local control of the pumping operations in accordance with the level of wastewater in the wet well.

Present day standards require that wastewater pumping stations have sufficient pumping capacity to handle peak incoming flows with the largest pumping unit out of service. Accordingly, it will be necessary to increase the capacity of the pumping equipment in all of these stations that serve separate sewer systems with the possible exception of Quincy which has adequate capacity. However, in the case of Quincy, due to the age of the equipment, the drive and pumping units should be replaced.

#### CHAPTER 4

### SEWER RELIEF REQUIREMENTS UNDER SERVICE AREA CONCEPTS STUDIED

## General

Five alternative basic concepts are considered in this study for the collection and disposal of sewage flows from the Eastern Massachusetts Metropolitan Area. The sewer relief requirements under the fifth concept are identical to those in Concept 4, consequently, required changes to the existing MSD system as presented for Concept 4 below, also apply to Concept 5. Detailed descriptions of each concept are given in Technical Data Volumes 4 (Concepts 1 through 4) and 5 (Concept 5). For comparison of areas to be served in the year 2000 with the present service areas see Tables 2-1 and 2-3.

# Concept 1

This concept is visualized as a regional plan to upgrade the existing MSD service area. This increases the areas served by the Deer and Nut Island treatment plants to the following:

Deer Island service From 68,200 to 87,600 sewered acres

Nut Island service From 64,600 to 99,300 sewered acres

Addition of the towns of Lincoln, Lynnfield and Weston to the existing North System and Dover, Hopkinton, Sharon and Sherborn to the existing South System are included in this plan. The interceptors that require relief under this concept are illustrated on Figure 4-1 (bound in back). Table 4-1 lists the interceptors (in groupings by section number) requiring relief, the year relief is required and the lengths and sizes of these relief sewers.

## Concept 2

Concept 2 is visualized as a regional plan with some contraction of the existing Deer Island and Nut Island service areas to the following:

Deer Island service From 68,200 to 72,700 sewered acres

Nut Island service From 64,600 to 37,100 sewered acres

TABLE 4-1. MDC INTERCEPTOR RELIEF REQUIREMENTS UNDER CONCEPT 1

Group No.	Interceptor requiring relief Y	Year relief required	Relief sewer size, in.	Length, f	ft. S	System
1	Millbrook Valley Sewer - Section 84 - Section 85	Now Now	1	1,060	ZZ	North North
0	Wilmington Extension Sewer - Section 89 (Portion) - Section 90	2000	36	870	ZZ	North North
m	ensio 76 (	Now	42 24 (FM)(1)		ZZ	North North
	- Section 75 (Portion) - Section 72 (Portion) - Section 71 (Portion) - Section 71 (Portion)	Now 2000 2000 2000	30 30 30	1,000	ZZZZ	North North North North
4	North Metropolitan Sewer - Section 44-1/2 (Portion) - Section 17 (Portion)	2000 Now	09	2,000	ZZ	North North
2	North Metropolitan Relief Sewer - Section 111 (Portion)	2000	54	2,000	Z	North
9	Chelsea Branch Sewer - Section 57 (Portion)	Now	21	1,140	Z	North.
7	Stoneham Extension Sewer - Section 51 (Portion) - Section 51 (Portion)	Now Now	8(2) 10(2)	1,000	22	North North

TABLE 4-1 (Continued). MDC INTERCEPTOR RELIEF REQUIREMENTS UNDER CONCEPT 1

Group No.	Interceptor requring relief	Year relief required	Relief sewer size, in.	Length, ft.	System
8	Stoneham Trunk Sewer - Section 42	Now	18	3,050	North
6	Wakefield Branch Sewer - Section 50 (Portion) - Section 50 (Portion) - Section 49	2000 Now Now	15 42 36	3,090 1,580 3,880	North North
10	Wakefield Trunk Sewer - Section 41 (Portion) - Section 41 (Portion) - Section 40	2000	24 48 48	3,040 2,700 6,235	North North North
11	North Charles Metropolitan Sewer - Section 63 (Portion) - Section 63 (Portion) - Section 63 (Portion)	Now Now Now	24 30 36	1,310 1,400 3,100	North North North
12	South Charles Relief Sewer - Section 4A (Portion) - Section 4A (Portion)	Now	36 48	5,120 3,840	North North

TABLE 4-1 (Continued). MDC INTERCEPTOR RELIEF REQUIREMENTS UNDER CONCEPT 1

ше		-	C	c .	C		C	C		<b>c</b>			c		5	4	4	2
Syste		North	North	North	North		North	North		North			North		South	South	South	South
Length, ft. System		1,440	3,040	2,800	7,090		2,300	5,510		009		10 10 10	200		026	790	3,160	4,000
Relief sewer size, in.		84	30	30	36		09	72		78			36		114	114	114	114
Year relief required		Now	2000	2000	2000		Now	Now		Now			Now		2000	2000	2000	2000
Group Interceptor requiring relief No.	South Charles Sewer	Н	H	- Section G	- Section F	South Charles Relief Sewer	- Section 5 (Portion)	- Section 5 (Portion)	Charles River Crossing	- Section 204	Cross-Connection Between	South Charles Sewer to	South Charles Relief Sewer	High Level Sewer	C	-	_	- Section 48 (Portion)
Group No.	13					14			15	`	16			17				

TABLE 4-1 (Continued). MDC INTERCEPTOR RELIEF REQUIREMENTS UNDER CONCEPT 1

Group No.	Inte	Group Interceptor requiring relief No.	Year relief required	Relief sewer size, in.	Length, ft.	. System	
18	Uppe	Upper Neponset Valley Sewer					
	1	56	Now	30	1,860	South	
	1	N	Now	30	3,460	South	
	.1	2	Now	30	4,570	South	
	1	29	Now	30	450	South	
	1	2	Now	54	4,250	South	
	1	Section 30	Now	24	6,720	South	
19	New	New Neponset Valley Sewer					
	1	-	2000	78	3,570	South	
	1	Section 108	2000	78	3,780	South	
	1		2000	78	4,450	South	
	1	Section 110	2000	72	3,180	South	
	1	Section 111	Now	84	2,600	South	
	1	Section 112	Now	84	2,600	South	
	1		Now	84	049.670	South	
	1	Section 113 (Portion)	Now	78	630	South	
	1	114	Now	78	5,800	South	
	1	Section 115 (Portion)	Now	78	4,330	South	
	1	_	Now	54	1,705	South	

TABLE 4-1 (Continued). MDC INTERCEPTOR RELIEF REQUIREMENTS UNDER CONCEPT 1

Stoughton Extension Sewer - Section 119 (Portion) - Section 119 (Portion) - Section 120 (Portion) - Section 121 (Portion) - Section 122 (Portion) - Section 124 1,550 South - Section 126 (Portion) - Section 136 (Portion) - Section 137 - Section 135 - Section 135 - Section 135 - Section 124 - Section 125 - Section 125 - Section 127 -	H	Interceptor requiring relief	Year relief required	Relief sewer size, in.	Length, ft.	System	1
ortion)  Now 36 3,220  36 3,300  ortion)  Sewer Now 60 54 40,400  ortion)  Now 54 1,550  3,300  ortion)  Now 60 6,700  Sewer 2000 30 6,700  ortion)  Now 60 5,530  Now 60 2,40  1,626  Now 60 2,270  ortion)  Now 60 5,700  ortion)  Now 60 2,878  ortion)  Now 27 7,600	St	nsion					
ortion) 2000 36 40 40 2000 ortion) 2000 36 3,300 ortion) Now 36 1,660 ortion) Now 60 54 40 0 1,660 ortion) Now 54 48 4,400 ortion) Now 60 5,700 ortion) Now 60 5,530 Now 60 0.1,626 Now 60 0.2,878 ortion) Now 60 2,878 ortion) Now 60 2,878 ortion) Now 27 7,600	•	9 (Por	Now	54	3,220	South	
ortion) 2000 36 24 1,550 ortion) Now 36 1,660 2,270 Sewer Now 54 1,660 2,270 2,270 ortion) Now 60 30 5,610 2000 30 6,700 ortion) Now 60 3,082 ortion) Now 60 2,878 ortion) Now 60 2,878 ortion) Now 60 2,878 Agh	•	119	2000	36	01	South	
ortion) 2000 24 1,550 ortion) Now 36 1,660 ortion) Now 60 54 6,700 ortion) Now 60 5,610 Sewer 2000 30 6,700 Sewer 2000 30 6,700 ortion) Now 60 1,626 Now 60 1,626 ortion) Now 60 2,878 ortion) Now 60 2,878 ortion) Now 27 7,600		120	2000	36	3,300	South	
ortion) Now 36 1,660  Sewer Now 60 4,400  ortion) Now 54 4,400  ortion) Now 48 4,930  Sewer 2000 30 6,700  Sewer 2000 30 6,700  ortion) Now 60 1,626  Now 60 3,082  ortion) Now 60 2,878  ortion) Now 60 2,878  ortion) Now 27 7,600		121	2000	24	1,550	South	
Sewer Now 60 2,270 crtion) Now 60 4,400 4,400 crtion) Now 54 48 4,930 crtion) Now 60 5,530 Now 60 1,626 Now 60 2,878 ortion) Now 60 2,878 ortion) Now 60 27 7,600 min Now 27 7,600		121	Now	36	1,660	South	
Sewer       Now       60       4,400         ortion)       Now       54       4,400         Now       54       5,740         Sewer       2000       30       5,610         Sewer       2000       30       6,700         Now       60       1,626         Now       60       3,082         Now       60       3,082         ortion)       Now       60       2,878         Now       60       2,878         ortion)       Now       27       744         Main       Now       24       7,600		121	Now	30	2,270	South	
ortion) Now 60 4,400 ortion) Now 54 4,400 A,930 A,930 Sewer 2000 30 5,610 6,700 ortion) Now 60 1,626 Now 60 2,878 ortion) Now 60 2,878 Ain Now 27 7,600	M	Extension					
Sewer Sewer 54 4,400 5,740		tion 116	Now		800	South	
Sewer 2000 30 5,740 4,930 2000 30 5,610 2000 30 6,700 6,700 ortion) Now 60 2,878 ortion) Now 60 2,878 Ain Now 27 7,600	ė	116	Now		•	South	
Sewer 2000 30 5,610 2000 30 6,700 6,700 ortion) Now 60 2,878 ortion) Now 60 2,878 Ain Now 27 7,600		H	Now		•	South	
Sewer 2000 30 5,610 2000 30 6,700 6,700 0.tion) Now 60 2,878 0.tion) Now 60 2,878 0.tion) Now 27 744 7,600		Section 11	Now		•	South	
2000 30 5,610 2000 30 6,700 Now 60 1,626 Now 60 3,082 ortion) Now 60 2,878 Now 27 744 Main Now 27 7,600	MA	Fatension					
2000 30 6,700 Now 60 5,530 Now 60 1,626 Now 60 2,878 ortion) Now 60 2,878 Main Now 27 7,600		on 135	2000	30	5,610	South	
Now 60 5,530 Now 60 1,626 Now 60 3,082 Now 60 2,878 ortion) Now 27 744 Main Now 24 7,600	•	Section 13	2000	30	6,700	South	
Sewer Sewer Now 60 5,530 I 122 Now 60 1,626 I 1,626 Now 60 3,082 I 124 Now 60 2,878 I 125 (Portion) Now 27 744 I 125 (Portion) Now 27 744	Bra	intree-Weymouth					
123 Now 60 124 125 (Portion) Now 60 2,878 125 (Portion) Now 27 744 Force Main	Ext	sension Sewer Section 122	MON .	. 09		South	
124 Now 60 3,082 125 (Portion) Now 60 2,878 125 (Portion) Now 27 744 Force Main Now 24 7,600		- Section 123	Now	09	•	South	
125 (Portion) Now 60 2,878 125 (Portion) Now 27 744 Force Main Now 24 7,600	•	124	Now	09	•	South	
125 (Portion) Now 27 744 Force Main Now 24 7,600	•	125	Now	09	•	South	
Force Main Now 24 7,600	•	125	Now	27		South	
	•	Forc	Now	54	•	South	

TABLE 4-1 (Continued). MDC INTERCEPTOR RELIEF REQUIREMENTS UNDER CONCEPT 1

System	South South South South South South South South South South	South South South South
Length, ft.	www.u,u,u,u,u,u,u,u,u,u,u,u,u,u,u,u,u,u,	10,500 11,090 2,000 8,175
Relief sewer Length, ft. size, in.	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	99999
Year relief required	MON WON WON WON WON WON WON	NOW NOW NOW
Group Interceptor requiring relief	Wellesley Extension Sewer - Section 98 - Section 99 - Section 100 - Section 101 (Portion) - Section 102 - Section 103 - Section 103 - Section 104 - Section 105 - Section 106 - Section 106	Framingham Extension Sewer - Section 132 - Section 133 B (Portion) - Section 133 B (Portion) - Section 134
Group No.	54	52

1. Force main.
2. Minimum recommended relief size is 12 inches.

In Concept 2, Lincoln, Lynnfield and Weston would be added to the MSD system but sewage flows from Lincoln and Weston would not flow to Deer Island. Instead sewage from Lincoln, Weston, Waltham, Watertown and part of Newton would be treated at a proposed treatment plant in the Watertown area. In the South Metropolitan System, Sherborn and Dover would be added but sewage flows would be treated at a proposed treatment plant on the Charles River together with flows from Natick, Wellesley, Needham and part of Dedham. Sharon would be added to the South System but sewage flows from Sharon would be treated at one of two proposed treatment plants in the Canton area along with sewage from Walpole, Stoughton and parts of Norwood and Canton. Figure 4-1 (bound in back) illustrates the relief requirements under Concept 2. Table 4-2 lists the interceptors requiring relief, year relief required and lengths and sizes of the relief sewers.

# Concept 3

Concept 3 is a regional plan with maximum possible expansion of the MSD system. This increases the areas served by the Deer and Nut Island plants to the following:

Deer Island service From 68,200 to 87,600 sewered acres

Nut Island service From 64,600 to area 111,400 sewered acres

In this concept, Lincoln, Lynnfield and Weston would be added to the North Metropolitan System. In the south, Southborough, Hopkinton, Holliston, Sherborn, Dover, Medfield, Millis, Medway, Milford, Norfolk, Franklin, Wrentham, Sharon and part of Bellingham would be added. Figure 4-1 illustrates the extent of relief required in this concept for the existing North and South Systems. Table 4-3 lists the interceptors requiring relief, year relief required and the sizes and lengths of relief sewers.

# Concept 4

Concept 4 is a regional plan with maximum decentralization of the existing MSD system by construction of additional upstream treatment plants within present service areas. This reduces the area served by the existing system at the Deer and Nut Island plants to the following:

Deer Island service From 68,200 to area 36,300 sewered acres

TABLE 4-2. MDC INTERCEPTOR RELIEF REQUIREMENTS UNDER CONCEPT 2

Leikui, 10.	1,060 North 11,680 North	870 North 8,660 North	1,350 North	5,460 North 3,000 North 2,000 North 1,000 North	2,000 North 2,600 North	2,000 North	1,140 North
Relief sewer Length, ft. size, in.	75 75 75	36	42 24(FM)(1)	88373	09	54	21
Year relief required	Now Now	2000	Now Now	Now 2000 8	2000 Now	2000	Now
interceptor requiring reliei	Millbrook Valley Sewer - Section 84 - Section 85	Wilmington Extension Sewer - Section 89 (Portion) - Section 90	Reading Extension Sewer - Section 76 (Portion) - Section 76 (Portion)	- Section 75 (Portion) - Section 72 (Portion) - Section 71 (Portion) - Section 71 (Portion)	North Metropolitan Sewer - Section 44-1/2 (Portion) - Section 17 (Portion)	North Metropolitan Relief Sewer - Section 111 (Portion)	Chelsea Branch Sewer - Section 57 (Portion)
Group No.	п	2	m		đ	2	9

TABLE 4-2 (Continued), MDC INTERCEPTOR RELIEF REQUIREMENTS UNDER CONCEPT 2

1 1						
System	North North	North	North North North	North North North	North North North	North
Length, ft.	1,000	3,050	3,090 1,580 3,880	3,040 2,700 6,235	1,310 1,400 3,100	5,120 3,840
Relief sewer size, in.	8(2)	18	15 42 36	488 488	30 30 36	36
Year relief required	Now Now	Now	2000 Now Now	2000 2000 2000	Now Now Now	Now Now
Interceptor requiring relief	Stoneham Extension Sewer - Section 51 (Portion) - Section 51 (Portion)	Stoneham Trunk Sewer - Section 42	Wakefield Branch Sewer - Section 50 (Portion) - Section 50 (Portion) - Section 49	Wakefield Trunk Sewer - Section 41 (Portion) - Section 41 (Portion) - Section 40	North Charles Metropolitan Sewer - Section 63 (Portion) - Section 63 (Portion) - Section 63 (Portion)	South Charles Relief Sewer - Section 4A (Portion) - Section 4A (Portion)
Group No.	7	ω	6	10	п	12

TABLE 4-2 (Continued). MDC INTERCEPTOR RELIEF REQUIREMENTS UNDER CONCEPT 2

1 1				
System	North North North North	South South South South South	South	South South South South South
Length, ft.	1,440 3,040 2,800 2,090	1,860 3,460 4,570 4,250 6,720	1,705	3,220 40 3,300 1,550 2,270
Relief sewer size, in.	330 30 30 30 30 30	57.533333	54	3864
Year relief Required	Now 2000 2000 2000	Now Now Now Now Now Now	Now	Now 2000 2000 2000 Now Now
Interceptor requiring relief	South Charles Sewer - Section H (Portion) - Section G - Section G - Section F	Upper Neponset Valley Sewer - Section 26 (Portion) - Section 27 - Section 28 - Section 29 (Portion) - Section 29 (Portion) - Section 30	New Neponset Valley Sewer - Section 115 (Portion)	Stoughton Extension Sewer-Section 119 (Portion) -Section 120 -Section 120 -Section 121 (Fortion) -Section 121 (Portion) -Section 121 (Portion)
Group No.	13	18	19	50

TABLE 4-2 (Continued). MDC INTERCEPTOR RELIEF REQUIREMENTS UNDER CONCEPT 2

Group No.	Interceptor relief required	Year relief required	Relief sewer size, in.	Length, it.	System
1	Walpole Extension Sewer - Section 116 (Portion)	Now	09	800	South
	- Section 116 (Portion)	Now	左	001,4	South
	- Section 117	Now	7.75	5,740	South
55	Westwood Extension Sewer - Section 135 - Section 136	2000	30.00	5,610	South
23	Braintree-Weymouth Extension Sewer - Section 122 - Section 123	Now	990	5,530	South
	- Section 124 - Section 125 (Portion) - Section 125 (Portion) - Hingham Force Main	Now Now Now	57.20	3,082 2,878 744 7,600	South South South South
54	Wellesley Extension Sewer - Section 102 - Section 103 - Section 104 - Section 105 - Section 106	00000000000000000000000000000000000000	88888	6,850 1,920 1,425 1,350	South South South South South

Force main. Winimum recommended relief size is 12 inches.

TABLE 4-3. MDC INTERCEPTOR RELIEF REQUIREMENTS UNDER CONCEPT 3

Interceptor requiring relief	Year relief required	Relief sewer size, in.	Length, ft.	System
Millbrook Valley Sewer - Section 84 - Section 85	Now Now	27 75 75	1,060	North North
Wilmington Extension Sewer - Section 89 (Portion) - Section 90	2000	36.86	870 8,660	North North
Reading Extension Sewer - Section 76 (Portion) - Section 76 (Portion) - Section 72 (Portion) - Section 72 (Portion) - Section 71 (Portion) - Section 71 (Portion)	Now Now 2000 2000	42 24 (FM)(1) 30 27 36	1,350 3,460 1,000 1,000	North North North North North
North Metropolitan Sewer - Section 44-1/2 (Portion) - Section 17 (Portion)	2000 Now	090	2,000	North North
North Metropolitan Relief Sewer - Section 111 (Portion)	2000	42	2,000	North
Chelsea Branch Sewer - Section 57 (Portion)	Now	21	1,140	North

TABLE 4-3 (Continued). MDC INTERCEPTOR RELIEF REQUIREMENTS UNDER CONCEPT 3

Group No.	Interceptor requiring relief	Year relief required	Relief sewer size, in.	Length, ft.	System
7	Stoneham Extension Sewer - Section 51 (Portion) - Section 51 (Portion)	Now Now	8(2) 10(2)	1,000	North North
80	Stoneham Trunk Sewer - Section 42	Now	18	3,050	North
O	Wakefield Branch Sewer - Section 50 (Portion) - Section 50 (Portion) - Section 49	2000 Now Now	15 45 36	3,090 3,090 3,880 80	North North North
10	Wakefield Trunk Sewer - Section 41 (Portion) - Section 41 (Portion) - Section 40	2000 2000 2000	778 788 788	3,040 2,700 6,235	North North North
Ħ	North Charles Metropolitan Sewer - Section 63 (Portion) - Section 63 (Portion) - Section 63 (Portion)	Now Now Now	24 30 36	1,310 1,400 3,100	North North North
12	South Charles Relief Sewer - Section 4A (Portion) - Section 4A (Portion)	Now Now	36	5,120 3,840	North North

TABLE 4-3 (Continued). MDC INTERCEPTOR RELIEF REQUIREMENTS UNDER CONCEPT 3

Group No.	Interceptor requiring relief	Year relief required	Relief sewer size, in.	Length, ft.	System
13	South Charles Sewer - Section H (Portion)	Now	817	1,440	North
	- Section H (Portion) - Section G - Section F	2000 2000 2000	% % %	3,040 2,800 2,090	North North North
14	South Charles Relief Sewer - Section 5 (Portion) - Section 5 (Portion)	Now Now	60	2,300	North North
15	Charles River Crossing - Section 204	Now	78	009	North
16	Cross-Connection Between South Charles Sewer to South Charles Relief Sewer	Now	36	700	North

TABLE 4-3 (Continued). MDC INTERCEPTOR RELIEF REQUIREMENTS UNDER CONCEPT 3

System	South South	South South South South South
Length, ft.	270 270 270 270 270 270 270 270 270 270	1,860 3,460 4,570 4,50 6,720
Relief sewer size, in.	######################################	57 733 33
Year relief required	5000 5000 5000 5000 5000 5000 5000 500	NOW NOW NOW NOW NOW
Interceptor requiring relief	High Level Sewer - Section 45 - Section 46 - Section 47 - Section 48 (Portion) - Section 49 - Section 50 - Section 51 - Section 52 - Section 54 - Section 55 - Section 54 - Section 55 - Section 56 - Section 60 - Section 60 - Section 61	Upper Neponset Valley Sewer - Section 26 (Portion) - Section 27 - Section 28 - Section 29 (Portion) - Section 30 - Section 30
Group No.	17	18

TABLE 4-3 (Continued). MDC INTERCEPTOR RELIEF REQUIREMENTS UNDER CONCEPT 3

System	South South South South South South South South South South	South South South South South	South South South
Length, ft.	ww. 4 w. v.	3,220 40 3,300 1,550 2,270	800 4,400 5,740
Relief sewer size, in.	888777788877 7288877788877	38578882	82728
Year relief required	2000 2000 2000 2000 Now Now Now Now Now	Now 2000 2000 2000 Now Now	Now Now Now Now
Interceptor requiring relief	New Neponset Valley Sewer - Section 107 - Section 108 - Section 110 - Section 111 - Section 112 - Section 113 (Portion) - Section 113 (Portion) - Section 114 - Section 115 (Portion) - Section 115 (Portion) - Section 115 (Portion)	Stoughton Extension Sewer - Section 119 (Portion) - Section 119 (Portion) - Section 120 - Section 121 (Portion) - Section 121 (Portion) - Section 121 (Portion)	<pre>Walpole Extension Sewer - Section 116 (Portion) - Section 116 (Portion) - Section 117 - Section 118</pre>
Group No.	19	50	ನ

TABLE 1-3 (Continued). MIX INTERCEPTOR RELIEF REQUIREMENTS UNDER CONCEPT 3

System	South	South	South South South	South South South	South South South South South
Length, ft.	5,610	5,530	2,878 2,878 744 7,600	8,8,8,2,6,2,6,2,6,2,6,2,6,2,6,2,6,2,6,2,	4,4,300 4,4,25 3,300 4,4,25
Relief sewer size, in.	30	999	55 57 57 57	68888	288888
Year relief required	2000	Now Now	Now Now Now	Now Now Now Now	Now Now Now Now Now
Interceptor requiring relief	Westwood Extension Sewer - Section 135 - Section 136	Braintree-Weymouth Extension Sewer - Section 123 - Section 123	- Section 124 - Section 125 (Portion) - Section 125 (Portion) - Hingham Force Main	Wellesley Extension Sewer - Section 98 - Section 99 - Section 100 - Section 101 (Portion)	- Section 101 (Fortlon) - Section 103 - Section 104 - Section 105 - Section 106
Group No.	22	23		24	

TABLE 4-3 (Continued). MDC INTERCEPTOR RELIEF REQUIREMENTS UNDER CONCEPT 3

1	1					
System		South	South	South		South South South
Length, ft.		3,590	06,910	2,000 8,175		1,600
Year relief Relief sewer	size, in.	000	99,	00		0.06
Year relief	required	MOM	Now Now	Now		2000 2000 2000
Interceptor requiring relief		Framingham Extension Sewer - Section 132 (Portion)	- Section 132 (Portion) - Section 133B (Portion)	- Section 133B (Portion) - Section 134	Wellesley Extension Relief Sewer	- Section 137 A - Section 137 - Section 138 (Portion)
Group	No.	52			56	

1. Force main. 2. Winimum recommended relief size is 12 inches.

Nut Island service From 64,600 to area 40,400 sewered acres

Figure 4-1 shows the extent of relief to the existing system required in this plan. Table 4-4 lists all interceptors that require relief, year relief required, and the sizes and lengths of the relief sewers.

## Estimated Costs and Priorities

Table 4-5 lists estimated costs of improvements for the various groups of interceptors under the four alternative concepts. The listed costs are divided into two categories; Present and Future. All interceptors that require relief now or in the near future (by 1980) are considered as present relief requirements. All other interceptors that require relief after 1980 are considered as future relief requirements. The estimated costs presented in Table 4-5 are based on estimated January 1975 ENR Index 2200 and include a 25 percent allowance for engineering and contingency.

Cost estimates presented do not include costs for extension sewers needed for connecting additional towns and communities to the existing North and South Metropolitan systems under the four alternate concepts. Table 4-6 lists the costs of these extension sewers and the total costs under the four concepts.

During the process of modeling the MDC interceptor system it was found that certain interceptor sections are already heavily surcharged and require immediate relief. In order to alleviate sewer surcharging and associated problems in these interceptors, it is suggested that highest priority be given to final engineering and design of these relief sewers. Table 4-7 lists the MDC interceptors that require high priority attention for relief under the four alternate concepts and the associated costs.

TABLE 4-4. MDC INTERCEPTOR RELIEF REQUIREMENTS UNDER CONCEPT 4

System	North North	North North	North North North	North	North North	North	North North North
Length, ft.	1,060 11,680	870 8,660	1,360 1,350 5,460	1,140	1,000 3,130	3,050	3,090 1,580 3,880
Relief sewer size, in.	75 75 75	36	42. 24 (FM)(1) 30	21	8(2) 10(2)	18	15 42 36
Year relief required	Now Now	2000	Now Now Now	Now	Now Now	Now	2000 Now Now
Interceptor requiring relief	Millbrook Valley Sewer - Section 84 - Section 85	Wilmington Extension Sewer - Section 89 (Portion) - Section 90	Reading Extension Sewer - Section 76 (Portion) - Section 76 (Portion) - Section 75 (Portion)	Chelsea Branch Sewer - Section 57 (Portion)	Stoneham Extension Sewer - Section 51 (Portion) - Section 51 (Portion)	Stoneham Trunk Sewer - Section 42	Wakefield Branch Sewer - Section 50 (Portion) - Section 50 (Portion) - Section 49
Group No.	1	7	m	9	7	ω	6

TABLE 4-4 (Continued), MDC INTERCEPTOR RELIEF REQUIREMENTS UNDER CONCEPT 4

1 1					
System	North North North	North North North	North North	North North North	South South South South South South
Length, ft.	3,040 2,700 6,235	1,310 1,400 3,100	5,120 3,840	1,440 3,040 2,800 2,090	1,860 3,460 4,570 4,50 6,720
Relief sewer size, in.	724 788 788	24 30 36	36	3333	5 5 <b>3</b> 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5
Year relief required	2000 2000 2000	Now Now Now	Now Now	Now 2000 2000 2000	Now Now Now Now Now
Interceptor requiring relief	Wakefield Trunk Sewer - Section 41 (Portion) - Section 41 (Portion) - Section 40	North Charles Metropolitan Sewer - Section 63 (Portion) - Section 63 (Portion) - Section 63 (Portion)	South Charles Relief Sewer - Section 4A (Portion) - Section 4A (Portion)	South Charles Sewer - Section H (Portion) - Section H (Portion) - Section G - Section F	Upper Neponset Valley Sewer - Section 26 (Portion) - Section 27 - Section 28 - Section 29 (Portion) - Section 30
Group No.	10	п	12	13	18

TABLE 4-4 (Continued). MDC INTERCEPTOR RELIEF REQUIREMENTS UNDER CONCEPT 4

Group No.	Interceptor requiring relief	Year relief required	Relief sewer Length, ft. size, in.	Length, ft.	System
	New Neponset Valley Sewer - Section 113 (Portion) - Section 114 - Section 115 (Portion) - Section 115 (Portion)	NOW NOW NOW NOW NOW	78 78 78 74 74	4,670 630 7,800 4,330	South South South South South
	Stoughton Extension Sewer - Section 119 (Portion) - Section 120 - Section 121 (Portion) - Section 121 (Portion) - Section 121 (Portion) - Section 121 (Portion)	Now 2000 2000 2000 Now Now	38558825	3,220 40 1,3300 1,660 2,270	South South South South South South
	Walpole Extension Sewer - Section 116 (Portion) - Section 117 - Section 118	Now Now Now Now	27.7.2	800 4,400 5,740 4,930	South South South South
	Westwood Extension Sewer - Section 135 - Section 136	2000	30	5,610 6,700	South South

TABLE --- (Continued). MDC INTERCEPTOR RELIEF REQUIREMENTS UNDER CONCEPT 4

1		
System	South South South South South	South South South South
Relief sewer Length, ft. System size, in.	5,530 1,626 3,082 2,878 7,44	6,850 20,920 3,425 350
Relief sewer size, in.	60 60 60 77 24	\$ \$ \$ \$ \$ \$
Year relief required	Now Now Now Now Now	2000 2000 2000 2000 2000
Interceptor requiring relief Year relief	Eraintree-Weymouth Extension Sewer - Section 122 - Section 124 - Section 125(Portion) - Section 125(Portion) - Hingham Force Main	Wellesley Extension Sewer - Section 102 - Section 103 - Section 104 - Section 105 - Section 106
Group No.	53	77

1. Force main. 2. Minimum recommended relief size is 12 inches.

ESTIMATED COST OF INTERCEPTOR RELIEF REQUIREMENTS UNDER CONCEPTS STUDIED TABLE 4-5.

Group(1)		Concept	F] [	interceptor impr		improvements in millions of 2 Concept 3	1	of dollars	S 4
No.	System	Present	Future	Present	Future	Present	Future	Present	Future
1	North	\$ 3.6	,	\$ 3.6	•	\$ 3.6	•	\$ 3.6	
2	North		\$ 3.2	1	\$ 3.2	, 1	\$ 3.2		\$ 3.2
3	North	1.2	0.8	1.2	0.8	1.2	8.0	1.2	1
4	North	1.2	0.5	1.2	0.5	1.2	0.5	1	•
2	North		9.0	1	9.0	1	9.0	1	1
9	North	0.2	1	0.2	1	0.2	1	0.5	1
7	North	8.0	1	0.8	1	0.8	1	0.8	1
8	North	0.5	1	0.5	1	0.5	1	0.5	•
6	North	8.0	0.5	α.0	0.7	0.8	0.2	0.8	0.2
10	North	•	5.0	ı	5.0	1	2.0	1	5.0
11	North	1.2	1	1.2		1.2	1	1.2	1
12	North	2.3		2.3	,	2.3	1	2.3	ı
13	North	0.4	1.2	4.0	1.2	0.4	1.2	7.0	1.2
14	North	12.0	1	ı	1	12.0	ı	1	1
15	North	9.0		1	1	9.0	1	1	1
16	North	0.2	-	•	-	0.2	1		-
Subtotal North	North	\$25.0	\$11.5	\$12.2	\$11.5	\$25.0	\$11.5	\$10.9	\$ 9.6

TABLE 4-5 (Continued). ESTIMATED COST OF INTERCEPTOR RELIEF REQUIREMENTS UNDER CONCEPTS STUDIED

Group (+)	System	Concept Present F	pt 1 Future	Concept 2 Present Fut	pt 2 Future	Concept Present F	pt 3 Future	Concept Present F	pt 4 Future
Subtotal North	North	\$ 25.0	\$ 11.5	\$ 12.2	\$ 11.5	\$ 25.0	\$ 11.5	\$ 16.9	\$ 9.6
17	South	1	20.4			-	88.0	1	1
18	South	9.3	1	9.3	1	9.3	1	9.3	1
19	South	15.3	14.8	9.0	1	15.3	14.8	8.4	1
20	South	1.6	0.8	1.6	8.0	1.6	0.8	1.6	0.8
21	South	12.1	1	12.1	1	12.1		12.1	•
22	South		2.4	1	2.4	1	2.4	1	2.4
23	South	7.5	1	7.5	ı	7.5	,	7.5	1
24	South	14.2	1	1	4.9	17.8	1	1	4.9
25	South	22.5	1	1	•	22.9	1	1	1
56	South	1	1	1	1		23.4	1	1
Subtotal South	South	\$ 82.5	\$ 38.4	\$ 31.1	\$ 9.6	\$ 86.5	\$129.4	\$ 38.9	\$ 9.6
Total	North & South	\$107.5	6.64 \$	\$ 43.3	\$ 21.1	\$111.5	\$140.9	\$ 49.8	\$ 19.2

ESTIMATED COSTS OF INTERCEPTOR IMPROVEMENTS AND EXTENSION SEWERS TABLE 4-6.

	Concept 1	pt 1	Conce	spt 2	Conce	pt 3	Conce	pt 4
Description	Present Future	Future	Present	Present Future	Present	Present Future	Present Future	Future
Extension sewers	\$ 8.5		- \$ 6.2		+ 46.4	1	\$ 6.2	. 1
Existing North and South system								
improvements(1)	•	107.5 \$ 49.9 43.3	43.3	\$ 21.1	\$ 21.1 111.5 \$140.9 49.8 \$ 19.2	\$140.9	49.8	\$ 19.2
Total	\$116.0	6.64 \$	\$116.0 \$ 49.9 \$ 49.5 \$ 21.1 \$157.9	\$ 21.1	\$157.9	\$140.9	\$140.9 \$ 56.0 \$ 19.2	\$ 19.2
								1

TABLE 4-7. MDC INTERCEPTORS REQUIRING HIGH-PRIORITY RELIEF AND ASSOCIATED COSTS

No.	system	Concept 1	Concept 2 Conce	Concept 3	Concept 4
г	Millbrook Valley Sewer (Sections 84 and 85)	\$ 3,600,000	\$ 3,600,000	\$ 3,600,000	\$ 3,600,000
8	Reading Extension Sewer (Sections 75 and 76)	n \$ 1,200,000	\$ 1,200,000	\$ 1,200,000	\$ 1,200,000
12	South Charles Relief Sewer (Section 4A)	\$ 2,300,000	\$ 2,300,000	\$ 2,300,000	\$ 2,300,000
23	Braintree-Weymouth Extension Sewer (Sections 122 thr 125 and Hingham force main)	through um \$ 7,500,000	\$ 7,500,000	\$ 7,500,000	\$ 7,500,000
†72	Wellesley Extension Sewer (Sections 98 through 106)	\$14,200,000	1	\$17,800,000	
25	Framingham Extension Sewer (Sections 132 through 134)	\$22,500,000	1	\$22,900,000	1
Total		\$51,300,000	\$14,600,000	\$55,300,000	\$14,600,000

## CHAPTER 5

# INTERCEPTOR RELIEF REQUIREMENTS UNDER THE RECOMMENDED PLAN

## General

The Recommended Plan visualizes the addition of the Towns of Lincoln, Lynnfield and Weston to the North Metropolitan System and Dover, Hopkinton, Sharon, Sherborn and Southborough to the South Metropolitan System. In addition, two new satellite wastewater treatment plants are proposed for the South Metropolitan System - discharging to the middle Charles and upper Neponset Rivers. The proposed Middle Charles Treatment Plant would serve Ashland, Framingham, Hopkinton, Natick, Sherborn and Southborough and parts of Dover and Wellesley. The proposed Upper Neponset Treatment Plant would treat wastewater from Sharon, Stoughton and Walpole and parts of Canton and Norwood. Under this Recommended Plan areas served by the four treatment plants would be as follows:

Existing Deer Island Treatment Plant	From 68,200 to acres in year	87,600 sewered 2000
Existing Nut Island Treatment Plant	From 64,600 to acres in year	58,000 sewered 2000
Proposed Middle Charles Plant	24,100 sewered year 2000	acres in
Proposed Upper Neponset Plant	17,200 sewered year 2000	acres in

# Relief Requirements

MDC interceptors requiring relief under the Recommended Plan are shown in Figure 5-1 (bound in back). The extent and size of pipes to be relieved are shown in Table 5-1 along with the estimated time when such relief would be required.

Relief sizes shown in Table 5-1 are based on the assumption that such relief would be constructed parallel to existing pipes. In final design, other more appropriate alignments, and slopes may be selected. For this reason, the design flows for each sewer to be relieved is presented in Table 5-2.

TABLE 5-1. RELIEF REQUIREMENTS UNDER THE RECOMMENDED PLAN

Group	Name and MDC section number		Time	Relief sewer	N D M D M D M D M D M D M D M D M D M D
No.	relief	System	required	Size, (in.)	Length, (ft)
1	Millbrook Valley Sewer - Section 84	North North	1980-85 1980-85	36	1,060
~	Wilmington Extension Sewer - Section 89 (Portion) - Section 90	North North	2000	30	870
m	Reading Extension Sewer - Section 76 (Portion) - Section 76 (Portion) - Section 75 (Portion)	North North North	Ongoing Ongoing Ongoing	42 24 (FM) <sup>(1)</sup> 30	1,360 1,350 5,460
7	North Metropolitan Sewer - Sections 44-1/2, 67,112 - Section 17 (Portion)	North North	2000 1985-90	54 60	2,000
72	Chelsea Branch Sewer - Section 57 (Portion)	North	1985-90	21	1,140
9	Revere Extension Sewers - Section 57A - Section 62	North North	1990-95	12 30	1,030
7	Stoneham Extension Sewer - Section 51 (Portion)	North	1985-90	12	4,130
80	Stoneham Trunk Sewer - Section 42	North	1985-90	18	3,050

TABLE 5-1 (Continued). RELIEF REQUIREMENTS UNDER THE RECOMMENDED PLAN

Group No.	Name and MDC section number of interceptor requiring relief	System	Time relief required	Relief Size, (in.)	sewer Length, (ft)
6	Wakefield Branch Sewer - Section 50-60 (Portion) - Section 50-60 (Portion) - Section 49-59, 49-60	North North North	2000 1985-90 1985-90	15 42 42	3,090 1,580 3,880
10	Wakefield Trunk Sewer - Section 59-41 (Portion) - Section 58-41 (Portion) - Section 87-40	North North North	2000 2000 2000	4 8 4 2 4 2 .	3,040 2,700 6,235
11	North Charles Metropolitan Sewer - Section 63 (Portion) - Section 63 (Portion)	North North	1980-85 1980-85	24 36	2,710 3,100
12	South Charles Relief Sewer - Section 4A (Portion) - Section 4A (Portion)	North North	1990-95 1990-95	36 48	5,120 3,840
13	South Charles Relief Sewer - Section 4-H (Portion) - Section 4-G - Section 4-G - Section 4-F - Section 3-F - Section 3-F	North North North North North	1990-95 2000 2000 2000 2000	88 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	1,440 3,040 2,800 7,690 3,720
14	South Charles River Sewer - Section 5-C (Portion) - Section 5-B and 5-A (Portion)	North North	2000	54	2,300

TABLE 5-1 (Continued). RELIEF REQUIREMENTS UNDER THE RECOMMENDED PLAN

(ft)					
f sewer Length,	009	700	4,970	7,470	1,860 4,570 4,570 4,550 6,720
Relief (in.)					
Size,	54	36	36	24	\$
Time relief reguired	2000	2000	1990-95	1985-90 1985-90	Ongoing Ongoing Ongoing Oinging Oinging
System	North	North	North	North North	South South South South South South
Name and MDC section number of interceptor requiring relief	Charles River Crossing - Section 204 (cost included with Section 5-C)	Cross-Connection Between South Charles River Sewer and South Charles Relief Sewer (cost included with Section 5-C)	Cummingsville Branch Sewer - Section 47-86	Somerville-Medford Branch Sewer - Section 35 (Portion) - Section 35 (Portion)	Upper Neponset Valley Sewer - Section 26 (Portion) - Section 27 - Section 28 - Section 29 (Portion) - Section 30
Group No.	15	16	17	18	19

TABLE 5-1 (Continued). RELIEF REQUIREMENTS UNDER THE RECOMMENDED PLAN

Group No.	Name and MDC section number of interceptor requiring relief	System	Time relief required	Relief Size, (in.)	sewer Length, (ft)
20	New Neponset Valley Sewer - Section 115 (Portion) - Section 115 (Portion)	South	1980-85 1980-85	78 54	500(2) 1,705
21	Stoughton Extension Sewer - Section 119 (Portion) - Section 120 (Portion) - Section 121 (Portion) - Section 121 (Portion) - Section 121 (Portion) - Section 121 (Portion)	South South South South South	1980-85 2000 2000 2000 1980-85 1980-85	300 4486 44 300 4486 44 300 4486 4486 4486 4486 4486 4486 4486 44	3,220 40 3,300 1,550 2,270
22	Walpole Extension Sewer - Section 116 (Portion) - Section 116 (Portion) - Section 117	South South South	1980-85 1980-85 1980-85 1980-85	09 09 18 18	800 4,400 5,740 4,930
23	Westwood Extension Sewer - Section 135 - Section 136	South	2000	30	5,610 6,700
24	Braintree-Weymouth Extension Sewer - Section 122 - Section 124 - Section 125 - Section 125 - Section 125 - Hingham Force Main	South South South South South	Ongoing Ongoing Ongoing Ongoing 1980-85	60 60 60 60 24 24 (FM)	5,530 1,626 3,082 2,878 744 7,600

RELIEF REQUIREMENTS UNDER THE RECOMMENDED PLAN TABLE 5-1 (Continued).

(ft)	
Relief sewer Size, (in.) Length, (ft)	10,500 11,090 2,000 8,175
Relief	
Size,	9999
Time relief required	1980-85 1980-85 1980-85
System	South South South
Name and MDC section number of interceptor requiring relief	Framingham Extension Sewer - Section 132 - Section 133B (Portion) - Section 133B (Portion) - Section 134
Group No.	25

1. Force main. 2. Up to proposed treatment plant in Canton.

TABLE 5-2. DESIGN FLOWS FOR MDC INTERCEPTORS REQUIRING RELIEF

	New ond MDC coeties sumbon			
No.	Name and ADO Section number of interceptor requiring relief	Total existing capacity, (cfs)	Total design flow, (cfs)	Design flow year
1	Millbrook Valley Sewer - Section 84 - Section 85 (Portion) - Section 85 (Portion) - Section 85 (Portion)	16.1 16.6 14.9 14.0	3335.9 335.9 35.9	2020 2020 2020 2020
N	Wilmington Extension Sewer - Section 89 (Portion) - Section 90 (Portion) - Section 90 (Portion) - Section 90 (Portion)	29.0 28.5 17.5	333.0 333.0 33.0	2050 2050 2050 2050
М	Reading Extension Sewer - Section 75 - Section 76	8.0	24.2	2020
4	North Metropolitan Sewer - Sections 44-1/2-67-112 - Sections 17-87	98.9(1)	129.0	2050
2	Chelsea Branch Sewer - Section 57	5.9	9.3	2020
9	Revere Extension Sewer - Section 57A - Section 62	2.3	3.5	2020
7	Stoneham Extension Sewer - Section 51	3.7	5.3	2020

TABLE 5-2 (Continued). DESIGN FLOWS FOR MDC INTERCEPTORS REQUIRING RELIEF

No.	Name and MDC section number of interceptor requiring relief	Total existing capacity, (cfs)	Total design flow, (cfs)	Design flow year
80	Stoneham Trunk Sewer - Section 42	1.4	7.4	2020
6	Wakefield Branch Sewer - Sections 50-60 (Portion) - Sections 50-60 (Portion) - Sections 49-60 and 49-59	29.1(1) 22.5(1) 22.5(1)	35.6 48.7 51.7	2050 2020 2020
10	Wakefield Trunk Sewer - Sections 59-41 (Portion) - Sections 58-41 (Portion) - Sections 87-40	44.9(1) 50.6(1) 72.2(1)	8658 88.8 88.8	2050 2050 2050
11	North Charles Metropolitan Sewer - Section 63 (Portion) - Section 63 (Portion)	7.5	12.6	2020 2020
12	South Charles Relief Sewer - Section 4A (Portion) - Section 4A (Portion)	17.8	53.2 68.6	2020
13	South Charles Relief Sewer - Sections 4-H (Portion) - Sections 4-G - Sections 4-G - Sections 4-F - Sections 3-F - Sections 3-F	53.4(1) 97.3(1) 98.1(1) 98.1(1) 122.0(1) 129.0(1)	98.0 114.0 121.2 140.0 166.0	2020 2050 2050 2050 2050

TABLE 5-2 (Continued). DESIGN FLOWS FOR MDC INTERCEPTORS REQUIRING RELIEF

3						
Design flow year	2050	2020	2020	2020	2020 2020 2020	2020 2020 2020 2020 2020 2020
Total design flow, (cfs)	267.0	267.0	ħ°6ħ	43.8	8.9 17.0 29.9	26.33 2.4.1 2.4.1 2.4.1 1.2.4.1 1.2.4.1
Total existing capacity, (cfs)	232.0(1) 236.0(1)	227.0	31.5	20.2	6.8 14.0 17.6	112 125.0 120.0 120.0 1.66 1.66 1.66 1.66 1.66 1.66 1.66 1
Name and MDC section number of interceptor requiring relief	South Charles River Sewer - Sections 5-B and 5-A	Charles River Crossing - Section 204	Cross Connection Between South Charles River Sewer (c) and South Charles Relief Sewer (1)	Cummingsville Branch Sewer - Sections 47-86	Somerville-Medford Branch Sewer - Section 35 (Portion) - Section 35 (Portion) - Section 35 (Portion)	Upper Neponset Valley Sewer - Section 26 (Portion) - Section 27 (Portion) - Section 27 (Portion) - Section 28 (Portion) - Section 28 (Portion) - Section 29 (Portion) - Section 29 (Portion) - Section 30 (Portion) - Section 30 (Portion)
No.	14	15	16	17	18	19

TABLE 5-2 (Continued). DESIGN FLOWS FOR MDC INTERCEPTORS REQUIRING RELIEF

No.	Name and MDC section number of interceptor requiring relief	Total existing capacity, (cfs)	Total design flow, (cfs)	Design flow year
20	New Neponset Valley Sewer - Section 115 (Portion) - Section 115 (Portion)	35.0	125.0	2020 2020
21	田して「田	amm	30 m	2020 2050 2050
	Section 120 (Portion) Section 120 (Portion) Section 121 (Portion) Section 121 (Portion) Section 121 (Portion) Section 121 (Portion)	28.7 128.7 14.4 6.5	0.004.004.000.000.000.000.000.000.000.0	2020 2020 2020 2020 2020
	Walpole Extension Sewer - Section 116 (Portion) - Section 116 (Portion) - Section 117 - Section 118 (Portion) - Section 118 (Portion)	26.0 32.0 25.5 19.7	75.4 64.2 57.8 57.8	2020 2020 2020 2020 2020
23	Westwood Extension Sewer - Section 135 (Portion) - Section 135 (Portion) - Section 136 (Portion) - Section 136 (Portion)	19.6 11.5 10.1	20.5 20.5 20.5	2050 2050 2050 2050

DESIGN FLOWS FOR MDC INTERCEPTORS REQUIRING RELIEF TABLE 5-2 (Continued).

No.	Name and MDC section number of interceptor requiring relief	Total existing capacity, (cfs)	Total design flow, (cfs)	Design flow year
24	Braintree-Weymouth Extension			
	Section 122 (Portion) - Section 122 (Portion) - Section 123 - Section 124 (Portion) - Section 124 (Portion) - Section 125 Branch	200 200 200 200 200 200 200 200 200 200	0.6888877 0.68969 0.6869	2020 2020 2020 2020 2020
	Forc	•	0	2020
52	Framingham Extension Sewer - Section 132 (Portion) - Section 132 (Portion) - Section 133B (Portion) - Section 133B (Portion) - Section 133B (Portion) - Section 133B (Portion) - Section 134 (Portion) - Section 134 (Portion)	337.55 44.837.8 337.8 37.8 37.9 9.7 9.9	124.0 121.0 121.0 121.0 97.1 86.7	2020 2020 2020 2020 2020 2020

1. Combined capacity of parallel sewer sections.

The estimated cost of interceptor relief in accordance with the groupings of pipes presented in Table 5-1 is shown in Table 5-3.

Under the Recommended Plan, extension of interceptors will be required to serve expected new member communities. The estimated size, flow and cost of these is shown in Table 5-4 along with the projected date when such facilities will be needed.

TABLE 5-3. ESTIMATED COST OF INTERCEPTOR IMPROVEMENTS REQUIRED UNDER THE RECOMMENDED PLAN

No.(1		Estimated cost, (millions of dollars)
1 2	Millbrook Valley Sewer Wilmington Extension	3.8 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7
	Sewer	3.0
3	Reading Extension Sewer	On-going
4	North Metropolitan Sewer	1.7
5	Chelsea Branch Sewer	0.1
5	Revere Extension Sewer	3.4
7	Stoneham Extension	
	Sewer	0.3
8	Stoneham Trunk Sewer	0.1
9	Wakefield Branch Sewer	1.0
10 11	Wakefield Trunk Sewer North Charles	4.8
	Metropolitan Sewer	1.3
12	South Charles Relief	
	Sewer	2.7
13	South Charles Relief Sewer	2.9
14	South Charles River Sewer	12.6
15	Charles River Crossing	Included in No. 14
16	Cross Connection	Included in No. 14
17	Cummingsville Branch Sewer	1.0
18	Somerville-Medford	Swarph Extendion Sower.
	Branch Sewer	4.5
		in a later
Subto	otal North System	43.2
19	Upper Neponset Valley	
20	Sewer New Neponset Valley	On-going
	Sewer	Included in No. 21
21	Stoughton Extension Sewer	1.9
22	Walpole Extension	1.,
22	Sewer	11.9
23	Westwood Extension	
	Sewer	2.4
24	Braintree-Weymouth	
	Extension Sewer	0.9
25	Framingham Extension	
	Sewer	22.5
0	tal Gauth Guata	20. 6
Subto	otal South System	39.6
Tot ol	North and South Systems	82.8
Total	. Not and South Systems	02.0

<sup>1.</sup> Numbers correspond to those in Table 5-1.

111-6

TABLE 5-4. INTERCEPTOR REQUIREMENTS FOR NEW COMMUNITIES UNDER THE RECOMMENDED PLAN

Interceptor designation	Size, (in.)	Length, (ft)	Cost, (\$)		
Lynnfield Extension	varies				
Sewer	12 in.				
	to				
	21 in.	6,000	\$ 367,000		
Ashland-Hopkington	varies				
Extension Sewer	21 in.				
	to				
	48 in.	36,700	\$ 4,459,000		
Weston Lincoln	varies				
Extension Sewer	30 in.				
	to				
	42 in.	33,400	\$ 3,832,000		
Southboro Extension Sewer	varies				
	24 in.				
	to				
	36 in.	26,800	\$ 2,421,000		
Sharon Extension Sewer	36 in.	7,400	\$ 1,218,000		
Total			\$12,297,000		

#### CHAPTER 6

# WASTEWATER PUMPING STATION ANALYSIS AND IMPROVEMENTS

#### General

This chapter covers the following 10 existing pumping stations. Their approximate location and their dry weather flow service areas are shown on Figure 6-1 (bound in back).

Alewife Brook East Boston Steam Houghs Neck

Braintree-Weymouth East Boston Electric Quincy

Charlestown Hingham Reading

Squantum

The remaining two, namely the Old Deer Island and Winthrop pumping stations are not discussed in this chapter due to their status of not being used. The Deer Island Pumping Station was not inventoried because it has been decommissioned and its prime pumping equipment has been removed. The Winthrop Pumping Station was, however, inventoried and is presented in Appendix F.

Under all of the wastewater management concepts under study, these pumping stations must be retained to provide for the needs of their service areas. The purpose of this chapter is to delineate the need for modifying these stations to meet present requirements more efficiently, and to determine the most economical designs that will provide pumping stations capable of meeting the requirements of their service areas some 25 years hence.

With the exception of the Alewife Brook and Hingham pumping stations, all are over 25 years old. Today's standards for the design of wastewater pumping stations are appreciably different from those generally accepted during the period when many of the existing facilities were constructed. Today's standards require more reliable operation and permit lower maintenance and operating cost, better access to the equipment and safer working conditions for the operating personnel. It can be anticipated that to meet today's design standards, many of the existing pumping stations will require such extensive modifications that replacement may be a preferable alternative.

Before presenting the findings on each pumping station, a general description of the function of the two East Boston pumping stations is given as follows and shown schematically on Figure 6-2. The East Boston Steam Pumping Station was constructed with the original North Metropolitan Sewer for the purpose of lifting sewage into the North Metropolitan Sewer after it crossed Chelsea Creek through siphons. Upon construction of a section of the North Metropolitan Relief Sewer down to Chelsea Creek, a temporary pumping station was constructed to lift flows from the relief sewer into Chelsea Creek until the relief sewer is extended to the outfalls off Deer Island. At that time, provision was also made for the East Boston Electric Pumping Station to function as a standby facility to the East Boston Steam Station. With the construction of the MDC tunnel system, namely the North Metropolitan Relief Tunnel and the Main Pumping Station at the Deer Island Treatment Plant, most flows normally entering the two East Boston pumping stations were diverted to the Chelsea Creek Headworks (described in the next chapter) for screening prior to entry into the tunnel. This has placed the two stations into a standby category except that the East Boston Steam Pumping Station still has to lift a relatively small amount of flow coming from the Orient Heights and East Boston Sewer. Flows from these two areas, plus flows from Winthrop, are the only sewage presently diverted to the lower end of the large North Metropolitan sewer during normal dry weather flows. In addition to acting as standby facilities for the Main Pumping Station at the Deer Island Treatment Plant, these facilities can also provide additional transmission capacity to Deer Island during wet weather flows.

## Evaluation Procedure

Detailed inventories of the pumping stations were conducted by electrical and mechanical engineers experienced in pumping facility design and operation.

In addition, major pumping stations were inspected and evaluated by Mr. Allen J. Burdoin, consultant to Metcalf & Eddy, for their feasibility of upgrading.

The sections on pumping station improvements are the results of these inspections and evaluations.

Appendix E presents a list of abbreviations that were used extensively in the inventory analysis of both the pumping stations and headwork facilities. Appendix F presents a detailed inventory of the major equipment in the MDC pumping stations.

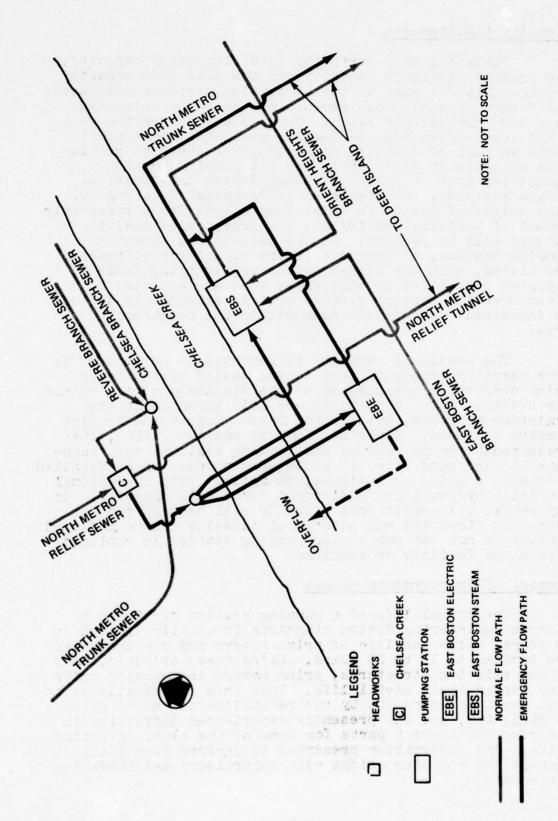


FIG. 6-2 FUNCTION OF MDC EAST BOSTON PUMPING STATIONS

#### Capacity Requirements

Table 6-1 sets forth the total installed capacity, the present available capacity and the year 2000 capacity requirements for each of the 10 pumping stations evaluated. The future capacity requirements are based on estimated year 2000 dry weather flows. Those stations serving combined sewer areas must be further evaluated for capacity needs as part of detailed combined sewer overflow regulation analysis in their areas and all pumping station capacities must be further studied during Infiltration/ Inflow Analyses. As discussed in Technical Data Vol. 2, flow quantitification in this study allows for a reasonable amount of infiltration/inflow, but presumes excessive amounts will be removed. In the case of the Squantum Pumping Station, alternative future capacity requirements are listed, with the higher values representing those reported quantities of wastewater that are expected to occur when the present service area is extended to include an industrial park development within the neighboring area.

The available capacity is reported to be limited in some cases by excessive head losses caused by the force mains and/or the arrangement of the discharge piping within the station. Such conditions are said to exist at the Braintree-Weymouth, East Boston Steam, Quincy and Reading pumping stations. Since at times of maximum inflow, the Braintree-Weymouth, Quincy and Reading stations must regulate the incoming flow, it would seem prudent where detailed hydraulic studies so indicate, to relieve this operational condition by providing additional force main capacity. In any event, this additional capacity will be required for year 2000 flows and any additional capacity can be utilized whether or not the particular pumping station is replaced with a new facility or retained.

## Summary of Improvements Needed

The normal life of a pumping station structure by today's engineering design standards is usually limited to 50 years, while the life of prime movers and pumping units are limited to 15 to 20 years. Using these criteria, many of the existing structures, prime movers and pumping units have served their useful life. That this is actually so in most cases is borne out by the rehabilitation needs noted in Table 6-2, and the presently experienced difficulty in securing replacement parts for some of the older operating units. The information presented is derived from field inspections and discussions with supervisory and operating personnel.

TABLE 6-1. FUTURE CAPACITY REQUIREMENTS FOR DRY WEATHER FLOWS - 2000

		Installed capacity largest		2000 ca require			
Pumping station	Total installed capacity, mgd		Estimated available capacity, mgd	Average dry weather, mgd	Peak dry weather, mgd	Type of area served	Remarks
Alewife Brook	90.6	64.4	90.6	13.7	30.9	Combined- separate	
Braintree-Weymouth	60	40	44(1)	26.9	58.7	Separate	Increased pump- ing capacity to 60 mgd with largest unit out of service.
Charlestown	140	90	140	33.3	73.3	Combined- separate	
East Boston Steam	205(3)	105	135-150(2)	8.8	20.0	Combined	Provide addi- tional smaller capacity pump- ing units to handle dry weather flows.
East Boston Electric	125	50	125	Stand	by	Combined	
Hingham	4.2	2.8	3.5	2.5	8.3	Se ate	increase pump- ing capacity to 9 mgd with largest unit out of service.
Houghs Neck	2.8	1.4	-	1.2	2.2	Separate	Increase pump- ing capacity to 3 mgd with largest unit out of service.
Quincy	52	32	20.0(2)	14.5	26.2	Separate	
Reading	8	4	4.0(2)	4.9	14.0	Separate	Increase capacity.
Squantum	8	4	5.0	2.4	4.4	Separate	
Total	595		577	10.0	18.0(4)	Separate	Increase capacity.

Capacity controlled by condition discharge piping and capacity of force main.
 Capacity controlled by force main.
 Excluding the 45 mgd capacity pump that has been out of service for many years.
 Estimates based on extensive industrial park development in expanded service area.

## TABLE 6-2. IMMEDIATE REHABILITATION NEEDS

PROVIDE VENTURI

PUMPING STATION	AGE OF STATION yrs.	PUMPING EQUIPMENT CAPACITY mgd	AGE OF PUMPING EQUIPMENT yrs.	DRIVE UNITS	AGE OF DRIVE UNITS yrs.	FLOW MEASUREMENT DEVICE	T MECHANICAL	
ALEWIFE BROOK	23	3 UNITS @ 26.2 1 UNIT @ 12.0	23 23	100 H.P. ELECTRIC MOTORS 50 H.P. ELECTRIC MOTOR	23	NONE	OVERHAUL PUMPING EQUIPMENT	OVER
		TOTAL 90.6	25	SU H.F. ELECTRIC HOTOL	23		MODIFY DISCHARGE PIPING, ADD CHECK VALVE & GATE VALVE	REPA
							REPLACE ORIGINAL BAR SCREENS AND CLEANING MECHANISMS WHEN NECESSARY	UPGI
RAINTREE - WEYMOUTH	39	2 UNITS @ 20 1 UNIT @ 20	3 16	220 H.P. DIESEL ENGINES 203 H.P. DIESEL ENGINE	3 16	NONE	REPLACE 16 YR. OLD DIESEL DRIVE AND PUMP UNIT	PRO
		TOTAL 60					ADD ADDITIONAL BAR SCREEN AND CLEANING MECHANISM	PRO
							REPLACE PRIMING SYSTEM	SYS
							OVERHAUL COOLING SYTEMS DRIVE UNITS 2 AND 3	
							REVISE INSIDE DISCHARGE PIPING ARRANGEMENT	
							PROVIDE MOTORIZED SLUICE GATES IN INFLUENT LINE	
ARLESTOWN	74	2 UNITS @ 45	18	175 H.P. DIESEL ENGINES	18	NONE	REPLACE PUMPING UNITS	PR
		1 UNIT @ 50	12	270 H.P. DIESEL ENGINE	12		REPLACE DIESEL ENGINES	RE
		TOTAL 140					REPLACE SUCTION AND DISCHARGE PIPING	
							REPLACE SUCTION AND DISCHARGE VALVES	
							REPLACE BAR SCREENS	
AST BOSTON STEAM	84	1 UNIT @ 60	23	UNIFLOW STEAM ENGINE	23	NONE	REPLACE BAR SCREENS	UP
		1 UNIT @ 45 1 UNIT @ 100	84 60	STEAM ENGINE 750 H.P. DIESEL ENGINE	84 17		REPLACE STEAM ENGINE AND PUMPS AS NECESSARY	
		TOTAL 205					REPLACE VALVES IN SUCTION	
		1 UNIT @ 45 NOT OPERABLE	84	STEAM ENGINE	84		AND DISCHARGE PIPING	
MET MESTON ELECTRIC	30	1 UNIT @ 75	30	600 H.P. ELECTRIC MOTOR	30	VENTURI METER	REPLACE BAR SCREENS	PE
ME CHELSEA SCHEEN CHANGER		1 UNIT @ 50	30	400 H.P. ELECTRIC MOTOR	30	(NOT CONNECTED)	REPAIR VENTURI INDICATING SYSTEM	G
		TOTAL 125					PROVIDE NEW PRIMING SYSTEM	PI
							CHECK PUMPS TO DETERMINE IF THEY REQUIRE REPLACEMENT	RI
	17	3 00175 0 1.4	17	60 H.P. ELECTRIC MOTORS	17	PARSHALL FLUME	REPLACE PUMPING UNITS	P
		101AL 4.2					REPLACE GATE VALVES IN DISCHARGE PIPING	G

## EHABILITATION NEEDS OF MDC PUMPING STATIONS

PROVIDE VENTURI

MECHANI CAL	ELECTRICAL	ARCHITECTURAL	HEATING - PLUMBING	VENTILATING	OUTSIDE PIPING
OVERHAUL PUMPING EQUIPMENT	OVERHAUL ELECTRIC MOTORS	REPAIR ROOF REPLACE GUTTERS	INSTALL NEW BOILER & NEW HEATING SYSTEM	INSTALL NEW VENTILATION SYSTEM IN WET WELL AREA	PROVIDE VENTURI METERS II
MODIFY DISCHARGE PIPING, ADD CHECK VALVE & GATE VALVE	REPAIR AUTOMATIC CONTROL SYSTEM-REPLACE RHEOSTATS				
REPLACE ORIGINAL BAR SCREENS AND CLEANING MECHANISMS WHEN NECESSARY	UPGRADE FLOURESCENT LIGHTING	POINT UP WALLS	INSTALL NEW OUTSIDE FUEL TANK	PROVIDE VENTILATION IN WET WELL AND BAR SCREEN AREAS	PROVIDE VENTURI METER REPLACE AND REDESIGN FORCE MAIN
REPLACE 16 YR. OLD DIESEL DRIVE AND PUMP UNIT	PROVIDE AC SUPPLY TO BOILER	PROVIDE ISOLATED AREA FOR BOILER	INSTALL NEW BOILER AND HEATING SYSTEM INSTALL' NEW PLUMBING SYSTEM		
ADD ADDITIONAL BAR SCREEN AND CLEANING MECHANISM	PROVIDE AC SUPPLY FOR LIGHTS & REVISE LIGHTING SYSTEM.	PROVIDE WORKSHOP AREA	THOTALE HER PEDITORIA GROTEIN		b
REPLACE PRIMING SYSTEM	or or care	REPLACE GUTTERS			
OVERHAUL COOLING SYTEMS		REPLACE WINDOWS			
DRIVE UNITS 2 AND 3		POINT UP WALLS			
EVISE INSIDE DISCHARGE IPING ARRANGEMENT		PROVIDE STORAGE AREA			
ROVIDE MOTORIZED SLUICE ATES IN INFLUENT LINE					
EPLACE PUMPING UNITS	PROVIDE A.C. SERVICE	POINT UP WALLS	REPLACE BOILER AND HEATING	PROVIDE ADEQUATE VENTILATION IN SCREEN ROOM AND PUMP PITS.	
EPLACE DIESEL ENGINES	REPLACE ELECTRIC LIGHTING	REPAIR FLOORS	SYSTEM	IN SCREEN ROOM AND PUMP PITS.	
EPLACE SUCTION AND ISCHARGE PIPING					
REPLACE SUCTION AND DISCHARGE VALVES					
REPLACE BAR SCREENS					
REPLACE BAR SCREENS	UPGRADE ELECTRIC LIGHTING	REPAIR ROOF	UPGRADE BOILER AND HEATING	INSTALL VENTILATION IN	PROVIDE VENTURI
EPLACE STEAM ENGINE ND PUMPS AS NECESSARY		POINT UP WALLS	SYSTEM	SCREEN ROOM & PUMP PITS	METER IN OUTSIDE FORCE MAIN
EPLACE VALVES IN SUCTION ND DISCHARGE PIPING		REPAIR BOILER ROOM FLOOR			
		PROVIDE NEW WINDOWS			
EPLACE BAR SCREENS	PROVIDE ANOTHER SOURCE		PROVIDE BOILER AND HEATING	PROVIDE IMPROVED VENTILATION	I N
REPAIR VENTURI INDICATING	OF POWER OR STANDBY GENERATOR		SYSTEM FOR PUMPING STATION IF EAST BOSTON STEAM IS ABANDONED	SCREEN CHAMBER AND ELECTRIC PUMPING STATION	
PROVIDE NEW PRIMING	PROVIDE LIGHTING SCREEN CHAMBER		AUAN WILL		
MECK PUMPS TO DETERMINE IF THEY REQUIRE REPLACEMENT	RECONNECT AND UPGRADE AUTOMATIC CONTROL SYSTEM				
REPLACE PUMPING UNITS REPLACE GATE VALVES IN DISCHARGE PIPING	PROVIDE ANOTHER SOURCE OF POWER OR STANDBY GENERATOR				ELIMINATE OVERFLOWS

## TABLE 6-2 (Continued). IMMEDIATE REHABILI

CONNECT VENTURI

PUMPING STATION	AGE OF STATION yrs.	PUMPING EQUIPMENT CAPACITY mgd	AGE OF PUMPING EQUIPMENT yrs.	DRIVE UNITS	AGE OF DRIVE UNITS yrs.	FLOW MEASUREMENT DEVICE	MECHANICAL
HOUGHS NECK	33	2 UNITS @ 1.4 TOTAL 2.8	1	10 H.P. ELECTRIC MOTORS	7	VENTURI (NOT CONNECTED)	UPDATE MOTOR CONTROL SYSTE
. (36) 6935 92.	ele distr di di di distributi	d jeder gene silv gene sene		iedol ed dese m mit classion e em erengi	onnanto Herrigo Morrigo		PROVIDE SUMP PUMP MODERNIZE WET WELL ARRANGEMENT
QUINCY	73	2 UNITS @ 20 1 UNIT @ 12 TOTAL 52	24 17	170 H.P. DIESEL ENGINES 66 H.P. DIESEL ENGINE	24 77	VENTURI (NOT CONNECTED)	REPLACE PUMPING UNITS NO. 1 AND NO. 2 AND DIESEL ENGINES
		labah ins					REPAIR VENTURI
							REPAIR CHECK VALVES ON DISCHARGE
							REPLACE AND RELOCATE ONE BAR SCREEN
							REPLACE PRIMING SYSTEM
							REVAMP INSIDE DISCHARGE PIPING
READING	54	1 UNIT @ 4	2	100 H.P. ELECTRIC MOTOR 120 H.P. DIESEL ENGINE	UNKNOWN 22	NONE	REPLACE ONE PUMPING UNIT
		1 UNIT @ 4	UNKNOWN	100 H.P. ELECTRIC MOTOR	50		ADD ADDITIONAL PUMPING UNI
		TOTAL 8					RECONSTRUCT WET WELL
							PROVIDE NEW BAR SCREENS AND BAR SCREEN CHAMBER
							REPLACE DIESEL UNIT OR PROVIDE STANDBY SOURCE OF POWER
SQUANTUM	38	1 UNIT • 4	38	60 H.P. ELECTRIC MOTOR 80 H.P. DIESEL ENGINE	38	VENTUR! (MOT CONNECTED)	PROVIDE MECHANICALLY CLEANED BAR SCREENS
		1 UNIT • 4	38	60 H.P. ELECTRIC MOTOR	38	ther demice any	REPLACE PUMPING EQUIPMENT
		TOTAL 8					REPLACE GATE VALVES IN SUCTION PIPING
							RECONSTRUCT WET WELL

## IMMEDIATE REHABILITATION NEEDS OF MDC PUMPING STATIONS

CONNECT VENTURI

A CHIDENENT	IMMEDIATE REHABILITATION NEEDS											
MEASUREMENT EVICE	MECHANICAL	ELECTRICAL	ARCHITECTURAL	HEATING - PLUMBING	VENTILATING	OUTSIDE PIPING						
VENTURI CONNECTED)	UPDATE MOTOR CONTROL SYSTEM AND VENTURI RECORDING SYSTEM	GENERAL REWIRING			UPGRADE VENTILATION SYSTEM							
	PROVIDE SUMP PUMP											
	MODERNIZE WET WELL ARRANGEMENT											
ENTURI	REPLACE PUMPING UNITS	UPDATE ELECTRIC LIGHTING	REPAIR ROOF									
	NO. 1 AND NO. 2 AND DIESEL ENGINES	SYSTEM	REPLACE GUTTERS	REPLACE AND RELOCATE BOILER	PROVIDE ADEQUATE VENTILATION IN WET WELL AREA AND PUMP	PROVIDE ADDITIONAL FORCE						
	REPAIR VENTURI		REPLACE WINDOWS	UPDATE HEATING SYSTEM	ROOM AREA							
	REPAIR CHECK VALVES ON DISCHARGE		POINT UP WALLS									
	REPLACE AND RELOCATE ONE BAR SCREEN											
	REPLACE PRIMING SYSTEM											
	REVAMP INSIDE DISCHARGE PIPING											
	REPLACE ONE PUMPING UNIT	PROVIDE NEW MOTOR CONTROL	REPAIR ROOF	PROVIDE NEW BOILER AND HEATING SYSTEM	PROVIDE NEW VENTILATION FACILITIES THROUGHOUT	PROVIDE ADDITIONAL FORCE MAIN						
	ADD ADDITIONAL PUMPING UNIT		REPAIR GUTTERS			PROVIDE VENTURI METERS						
	RECONSTRUCT WET WELL	PROVIDE NEW ELECTRIC MOTOR CONTROLS AND SWITCH GEAR	REPLACE AND MODERNIZE WINDOWS	PROVIDE ADEQUATE PLUMBING FACILITIES								
	PROVIDE NEW BAR SCREENS AND BAR SCREEN CHAMBER	UPDATE ELECTRICAL LIGHTING SYSTEM	WATERPROOF WALLS									
	REPLACE DIESEL UNIT OR PROVIDE STANDBY SOURCE OF POWER	PROVIDE STANDBY GENERATOR	PROVIDE ADEQUATE STORAGE AND WORKSHOP AREAS									
NTUR I	PROVIDE MECHANICALLY CLEANED BAR SCREENS	PROVIDE STANDBY GENERATOR	REPAIR GUTTERS	PROVIDE NEW BOILER	PROVIDE ADEQUATE VENTILATION THROUGHOUT							
THE CITED!			REPLACE WINDOWS	AND HEATING SYSTEM	InnouGrout							
	REPLACE PUMPING EQUIPMENT REPLACE GATE VALVES IN											
	SUCTION PIPING											
	RECONSTRUCT WET WELL											
Bright .												

The older stations namely, Charlestown, East Boston Steam, Quincy and Reading, require the most rehabilitation work. These stations range from 54 to 84 years of age. Generally, the rehabilitation work consists of providing new heating and electrical systems, replacement of drive and pumping units, providing adequate ventilation, modifying suction and discharge valves and piping, and installing new or additional bar screens.

At most pumping stations, it is anticipated that new drive units would consist of electric motors or drives of a type that can be controlled to regulate their speed in accordance with the level of wastewater in the wet well and correspondingly the output of the pumps. It is also preferred to locate the casing of the pumps below the minimum level of wastewater in the wet well, to avoid the installation of priming equipment which can be quite troublesome from a maintenance and automatic control operation standpoint.

To properly operate a pumping facility and to accurately monitor the wastewater flows within a wastewater collection and treatment system, it is necessary to continually measure and record the flows that are discharged by pumping stations. In many instances, adequate flow measuring devices are not available at the existing stations. For this reason, the rehabilitation work includes the installation of meters for this purpose.

It is important in certain instances that some of the rehabilitation work be undertaken immediately, because the ability of the particular station to meet present needs under existing conditions is marginal at best.

It should also be noted, however, that even with completion of the designated rehabilitation work many of the stations, possibly excluding the Alewife Brook, East Boston Electric and Hingham pumping stations, will not conform to present engineering standards for wastewater pumping stations. This is because accepted practice for stations requires provision of separate wet and dry well sections in both substructure and superstructure, adequate access to wet wells, dry wells and equipment, adequate working areas around bar screens and equipment, wet wells designed to reduce septicity problems by minimizing retention times, isolated boiler installations, and adequate facilities such as cranes, hoists, etc. for removal of equipment. Many of these standards cannot be met unless the structural arrangement of the existing stations are extensively altered and/or expanded.

The following sections contain a brief description of the operational features of each of the 10 existing stations presently used together with brief comments on improvements needed and alternatives where appropriate. These descriptions are listed in alphabetical order. A detailed inventory of the pumping station equipment is presented in Appendix F.

## Alewife Brook Pumping Station

As shown on Figure 6-1 (bound in back), this pumping station serves parts of Arlington, Belmont, Cambridge, Somerville and Medford.

It is one of the newer stations, built about 23 years ago, and, therefore, rehabilitation of the equipment listed in Table 6-2 should adequately bring the station to standards for handling of dry weather flows.

During the year 1971 the average daily pumping rate was 11.2 mgd (million gallons per day) and the maximum 24-hour rate was 45.3 mgd.

However, the Alewife Brook Pumping Station is operated at a rate of 90.6 mgd during times of storm runoff due to tributary combined sewers. Since this is the total installed capacity no standby pumping unit equal in capacity to the largest unit now in service is available at such times. Because of the configuration of the wet well and dry well, additional pumping capacity cannot be accomplished without expanding the wet well and dry well structures.

Another major difficulty in the operation of this pumping station occurs during rainstorms in that when the station is discharging at the rate of 90.6 mgd, the downstream sewer is surcharged and at times wastewater is discharged to the ground surface. Such discharges run across the ground to Alewife Brook. This situation can be remedied by providing a downstream relief sewer. It also can be remedied by eliminating the storm inflows to the pumping station by sewer separation or by combined sewer overflow regulation at selected points to handle any excess flows.

The work that will be required to properly rehabilitate this station can be best determined after detailed studies are made to determine the economics and possibility of effectively reducing the storm inflows to the station.

## Braintree-Weymouth Pumping Station

This station pumps sewage from the Braintree-Weymouth Extension Sewer receiving sewage from Braintree, Hingham,

Randolph, Weymouth, and parts of Quincy into the South Metropolitan High Level Sewer discharging to the Nut Island Treatment Plant.

It contains three diesel engine driven direct connected horizontal single end suction sewage pumps. Each pump has a capacity of 20 mgd at 40 to 42 feet head and operates with a suction lift.

Unit No. 1 consists of a 24 inch Morris Pump operating at 510 rpm (revolutions per minute), driven by a 6 cylinder 8-1/2 by 8-1/2 turbocharged Waukesha Engine installed in May 1972.

Unit No. 2 consists of a 24 inch Worthington Pump operating at 510 rpm, driven by a 6 cylinder 9-1/2 by 10-1/2 normally aspirated Chicago Pneumatic engine installed in March 1970.

Unit No. 3 consists of a 24 inch Worthington Pump operating at 505 rpm, driven by a 6 cylinder 8 by 10 Enterprise engine installed in August 1958.

Each unit drives a belt-connected 20 kw DC generator. All engine auxiliaries and all station equipment including the starting air compressors, vacuum pumps for priming, bar screen, and radiator fans are driven by DC motors. Radiators are mounted on a balcony remote from the engines. Two small 40 year old 6 kw engine generator units provide DC power when none of the three pumping units are in use. A 15 kva 100 ampere 120/208 volt, 3-phase, 4-wire alternating current power supply was installed in May 1973, for operation of a future screenings grinder. This replaced a 220 volt, single phase, 3-wire system formerly in use. At present, alternating current is used only for lighting.

Sewage enters the station through a mechanically cleaned bar screen set almost vertically in a deep, narrow channel which extends into the station underneath the pump room floor. The pump suction pipes extend into and draw from this channel. Pumps discharge vertically and then horizontally, all three pumps discharging into a single special double wye branch fitting within the station.

During the calendar year 1971, the average flow pumped per day was 14.1 mgd, and the maximum flow pumped in 24 hours was 29.3 mgd. On a normal day, one pump was operated about 20 hours at a speed varying from 400 to 500 rpm. When the sewage level in the incoming channel drops to Elevation 95 the pump is shut down and not started

again until the sewage level reaches Elevation 102.5. This usually happens several times a day, the aggregate downtime amounting to about four hours. The station, therefore, appears to have adequate capacity for present flows.

The station is old, of late 19th century or early 20th century design, but well maintained. The main pumping units are relatively new, having replaced earlier Winton engine pumps in 1958, 1970, and 1972.

It is unfortunate that all three engines are of different manufacture, and that the pumps are by two manufacturers. This is a result of piecemeal replacement of the equipment and the requirement that the award must go to the low bidder. It makes proper maintenance of the equipment much more difficult and costly, and makes it almost impossible to stock adequate spare parts. Under today's conditions in industry it can result in equipment being out-of-service for long periods waiting for replacement parts that formerly were available off-the-shelf.

The continuation of the antique DC electrical system is also a result of piecemeal replacement of equipment.

The bar screen has no bypass channel or duplicate unit. It is so situated in a deep channel with restricted openings that it cannot be raked by hand in case of emergency. Emergencies have occurred when all that could be done was to push the screenings down from the top to provide some utilizable screen area at a high level to keep the pumps running, and hope that the level would not rise high enough to back up into basements in the low-lying service areas.

The operating staff consists of 12 men to provide superintendance and round-the-clock attendance by an operator and an assistant. To operate the type of equipment installed, this staff is needed, and has performed creditably.

The cost of manual operation of attended stations is great in relation to that of automated equipment and can seldom be justified. The payroll approximates \$2,000 per week, not counting fringe benefits, or \$104,000 per year. Since the sewage could be pumped electrically by 900,000 kw hours of energy, the labor cost alone is equivalent to 11.5 cents per kw hour. In addition, approximately 55,000 gallons of diesel fuel, 300 gallons of lube oil, and engine maintenance services are required.

An additional inlet channel and bar rack are needed immediately regardless of future alternative developments.

As an alternative to the station improvements listed in Table 6-2, consideration should be given to the construction of a new automatic unattended electric station with standby generating or pumping capacity remotely controlled by telemetry. This new station could be located adjacent to the existing station utilizing the existing influent channel and the existing and proposed bar racks to the extent found feasible.

Conversion of the existing station is automatic operation comparable to that just described for a new station is another alternative. This would require most of the improvements listed in Table 6-2 as well.

## Charlestown Pumping Station

This station lifts the sewage from Charlestown and portions of Cambridge, Somerville and Medford from a tunnel crossing under the Mystic River to a gravity intercepting sewer system leading to the Chelsea Headworks. The flow includes areas served by combined sewers. This station contains three pumping units consisting of diesel engines driving vertical shaft centrifugal pumps through right angle gears.

Units No. 1 and 2 consist of 36 inch Fairbanks-Morse bottom suction angle flow pumps rated at 45 mgd each at 11 foot head and 240 rpm driven by 175 hp. Fairbanks-Morse diesel engines Model 31A 6-1/4 S, rated 600 rpm.

Unit No. 3 consists of a 42 inch Fairbanks-Morse bottom suction angle flow pump driven by a Fairbanks-Morse 6 cylinder opposed piston diesel engine, Model 38F 5-1/4, rated 270 hp. at 720 rpm. The pump nameplate indicates the capacity as 35,000 gpm (50 mgd) at 17 foot head and 191 rpm. However, the 53rd annual report lists the capacity as 60 mgd at 18 foot head. We believe the latter rating is correct, since the right angle gear has a speed reduction ratio of 3.45 to 1 which would make the pump speed 208 rpm for a rated engine speed of 720 rpm, and the engine has sufficient capacity to operate the pump at this speed.

The pumps are located in individual circular pump pits with deep suction conduits taking off horizontally

from the influent tunnel and rising vertically beneath the pumps. Each suction conduit is supplied with a sluice gate which is practically inaccessible and at present cannot be operated. Each pump discharge is provided with a swing check valve but no gate valve. During the inspection of this station, the flapper had failed on Unit No. 1 and had been removed. A DeZurik knife valve was being installed to serve as a stop valve, and similar valves were planned for Units 2 and 3.

Each engine drives a belt connected DC generator, rated 20 kw on Units 1 and 2, and 30 kw on Unit No. 3. In spite of the fact that the station is located in the shadow of the huge Mystic Station of the Boston Edison Company, there is no AC power in the station and no public power connection.

Bar screens are of the cage type.

During the calendar year 1971 the average quantity pumped per day was 64 mgd and the maximum quantity pumped per day was 108 mgd. Since the peak hourly rate would be somewhat greater, it is obvious that the station does not have the capacity to pump peak flows as they arrive with any one unit out of service, let alone the largest unit. When a unit is out of service at peak flows, the sewage temporarily backs up in the incoming sewer.

The Charlestown Pumping Station serves combined sewers. Therefore, at times of storm runoff, the operating personnel usually operate all of the pumps within the station at a total discharge rate of approximately 140 mgd. At such times, the downstream sewer is normally surcharged.

Alternatives of reducing the storm inflows into this station must be studied. It is reported that a large portion of the combined sewer system in Charlestown will be separated under redevelopment. In addition to separation, consideration should be given to combined sewer overflow regulation by chlorine detention treatment systems. Such a system could be located on the south bank of the Mystic River downstream from the pumping station. Detailed studies and investigations should be undertaken to determine the best alternative solution.

The station is old. The present pumps replaced original steam engine driven units. Units No. 1 and 2 are approximately 18 years old and are in only fair condition. Unit No. 1 has been in operation 74,000 hours or 47 percent

of the time. Unit No. 2 has been in operation 83,000 hours or 53 percent of the time. Engines are an obsolete model, no longer in production. Unit No. 3 is 12 years old and has been in operation 53,500 hours or 51 percent of the time. Its condition was reported as only fair. Replacement parts have increased almost fivefold in price since the first order following installation and are no longer available off-the-shelf. Furthermore, they are manufactured only about once a year, resulting in long waits for essential parts.

The bar screens are old, must be raised and cleaned manually, and one of them will not go down all the way.

The pumps operate under a positive suction head. Access manholes to the sluice gates are deep and flooded, and the manhole steps are badly corroded, some missing entirely. To work on the pumps it is necessary to pump the sewage down and fasten a plate over the suction opening after removing the pump. Divers have been employed to assist in this operation to install temporary plugs in the suction lines. A diver was employed to put No. 3 sluice gate in operation but it was discovered subsequently that the guide grooves had become filled with a hard substance and the gate still could not be operated.

Failure of the check valves has posed a serious problem since, in the absence of discharge gate valves, the pumped flow can recirculate back to the suction through an idle pump. A DeZurik knife valve, pneumatically operated, is being installed on No. 1 unit. This is the only type of valve with a short enough laying length to fit in the available space. This valve will serve satisfactorily by opening it after a pump has been started and closing it just before a pump is shut down. Similar valves are proposed to be installed in the discharge of Units 2 and 3.

The operating staff, consisting of about 12 men, and the maintenance department have done a remarkable job keeping this station in operation under unusual difficulties due to the design and age of the station and its equipment.

The pneumatically operated knife valves should be installed as planned on all three pump discharge lines.

As an alternative to the rehabilitation program indicated in Table 6-2, the construction of a new electric station should be considered. Since the pumping station is

located on a very limited site which cannot be readily expanded to provide space for a new installation, a new facility is probably better located on the south bank of the Mystic River. This location would require the construction of force mains across and under the Mystic River to the sewer downstream of the existing pumping station. Because of the conditions under which this construction must be made, the cost of providing these force mains will be relatively high.

#### East Boston Steam Pumping Station

As shown on Figure 6-2, this station pumps sewage from areas of East Boston and Orient Heights plus flow normally tributary to the Chelsea Headworks but diverted to the siphon under Chelsea Creek by throttling of the inlet gates in the Headworks. Before construction of the tunnel to Deer Island, this station, in combination with the East Boston Electric Station, handled almost the entire flow from the North Metropolitan District. Throttling of the flow at the Chelsea Headworks diverting sewage to this station is normally due to the failure of the pumps at the Deer Island Main Pumping Station to pump their design flow. This station discharges sewage through the old North Metropolitan Sewer from which it is diverted to the Winthrop Terminal Facility for pumping into the Deer Island Treatment Plant.

Since the East Boston Steam Pumping Station serves the East Boston combined system, it receives large quantities of storm runoff at times of heavy rainfall. Because this station and the East Boston Electric Pumping Station in addition are required as standby to handle excess flows from the Chelsea Headworks, sufficient capacity must be maintained at these installations under present operating plans.

This pumping station is a tremendously large, old-fashioned brick station, built about 1898, with two tall stacks and four circular pump pits containing centrifugal pumps operating with flooded suctions.

Pumps No. 2 and 3 are driven by the original horizontal triple expansion steam engines and are rated 45 mgd each at 19 foot head. One of these pumps was operating during our visit to the station, and has ample capacity for the dry weather flow now received at the station. The other pump driven by a similar engine has been inoperable for many years. Pump No. 1 is driven by a uniflow steam engine approximately 23 years old through a right angle gear. The unit is rated 60 mgd at 24 foot head and operates on 130 psi gage steam pressure and 26 inch vacuum.

Pump No. 4 is driven by a 750 hp 12 by 15 Enterprise diesel engine, Model DSG-8, through a right angle gear and is rated 100 mgd at 19 foot head. Bar screens are of the manually cleaned cage type.

Three comparatively new Cleaver Brooks package boilers provide steam for the plant.

Electricity is generated by steam engine driven generators. The open type switchboard is antiquated and does not meet present day standards.

The building also houses maintenance shops of the MDC.

The operating staff consists of 14 men. This provides for a Second Class Power Plant Engineer and a Steam Fireman on each shift, 24 hours per day, and a Chief and an Assistant Chief Power Plant Engineer and three laborers on the daylight shift.

Whether the East Boston Steam Pumping Station should be replaced will require studies to determine the future role of this station within the Metropolitan District system. If such a study should indicate that the East Boston Steam Pumping Station is best used to serve only the needs of East Boston, then it will probably be best to replace this station with a small modern-type installation. In this event, the East Boston Electric Pumping Station would be rehabilitated to handle all excess flows from the Chelsea Headworks.

On the other hand, if the East Boston Steam Pumping Station is to be used to handle excess flows from the Chelsea Headworks, then it may not be economical to replace this station with a new facility. This is because the 60-inch connections from the Chelsea Headworks have been extended to the East Boston Steam Pumping Station and to relocate them to a new facility will be very costly.

It is, therefore, evident that this matter requires further investigation before it can be determined if the East Boston Steam Pumping Station should be replaced by a new facility or rehabilitated.

## East Boston Electric Pumping Station

This station was installed about 1938 to supplement the capacity of the East Boston Steam Station. Overflows from the Chelsea Headworks reach this station through two siphons passing under Chelsea Creek and the pumped sewage can be discharged to Chelsea Creek through two sluice gates as well as to the North Metropolitan Sewer leading to the Deer Island Treatment Plant. Reportedly it has not been necessary to discharge sewage to Chelsea Creek for the last eight years.

This station contains two deep vertical sewage pumps operating with flooded suctions and driven by electric motors located at ground level.

Pump No. 1 is a De Laval centrifugal sewage pump rated 75 mgd at 38.5 foot head driven by a direct connected 600 hp General Electric 4,000 volt motor at a speed of 320 rpm.

Pump No. 2 is a De Laval centrifugal sewage pump rated 50 mgd at 38.4 foot head driven by a 400 hp General Electric 4,000 volt motor at a speed of 394 rpm.

The switchboard is comparatively modern.

The station was designed to operate automatically but is now operated manually.

Bar screens are housed in an unsightly timber structure on the other side of Chelsea Creek in the yard of the Chelsea Headworks. Discharge gate valves, 36 inches and 42 inches in size, are located 40 feet above the pumps and are provided with Limitorque operators. Vacuum pumps are provided for exhausting air from the discharge line between the pumps and the gate valves before starting the motors in order to eliminate the possibility of waterhammer.

The sluice gates which permit discharge to Chelsea Creek are manually operated by hand cranks.

The screen house and screens are in poor condition. Brakes, chains and sprockets are badly worn; housings including electric motors are badly corroded. No ventilation or heating is provided. Railings around screen openings are dangerously corroded. Explosionproof lighting fixtures have been replaced by ordinary nonexplosionproof lights.

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Equipment, piping, pipe supports and conduits located in the pump room are badly corroded. The sump pump is in poor condition.

Some fastenings for electrical boxes have rusted away and the boxes are tied and hanging from other piping whose fastenings have rusted away also.

Lighting conduits in the pump pits have rusted extensively.

Pumps and motors are of modern design and suitable for many more years of service.

Continuous attendance should not be needed, since the station was designed to operate automatically. However, when emergency operation of the pumps is required an operator could be dispatched from another facility if necessary.

Corrosion damage should be corrected by repairs or replacement and equipment painted.

The screen house superstructure should be replaced by a modern fireproof facility with explosionproof electrical equipment. The bar racks should be completely reconditioned or replaced.

Additional improvements are listed in Table 6-2.

#### Hingham Pumping Station

The Hingham Pumping Station pumps sewage from the North Hingham Sewer District to the Braintree-Weymouth Extension Sewer via a long force main.

The Hingham Pumping Station is one of the newer pumping stations within the Metropolitan District and generally conforms to present engineering design standards. Provision has been made at this pumping station for adding an additional pumping unit when additional capacity is required. The existing equipment is in good condition and accordingly requires a minimum of rehabilitation work. For these reasons, this station with modification to the existing pumping capacity can be readily revamped to meet 2000 needs. The present force main is inadequate to handle 2000 flows and will require relief.

## Houghs Neck Pumping Station

This is a small MDC pumping station serving the section of Quincy near the High Level Sewer and the Nut Island Treatment Plant.

The station itself is very old. However, its pumping equipment has been upgraded recently. To minimize the requirements for operating personnel, this station was originally equipped with a relatively large wet well of horseshoe-shaped construction. These large wet wells permitted the storage of the incoming wastewater during low flow periods, which was pumped out of the system during the daylight hours when personnel were in attendance at the station. For this reason, the modernization of the wet well arrangement is proposed in Table 6-2 along with several other improvements.

## Quincy Pumping Station

This station pumps sewage from portions of Quincy into two force mains about three fourths of a mile long leading to the High Level Sewer.

This station is quite similar to the Braintree-Weymouth station. It contains three diesel engine driven direct connected horizontal single end suction sewage pumps operating with a suction lift.

Units No. 1 and 2 each consist of a 20 inch Fairbanks-Morse pump driven by a 170 hp Fairbanks-Morse 31 A 6-1/4 S diesel engine. Each pump is rated at 20 mgd at 33 foot head at 600 rpm.

Unit No. 3 consists of a 20 inch Worthington pump driven by a 66 hp, 3 cylinder 8 by 10 Enterprise diesel engine, Model DSM3. The unit has a rated capacity of 12 mgd at 26 foot head at 500 rpm.

Engines are radiator cooled with attached circulating water pumps and radiators mounted integrally with the engines. Radiator fans are belt driven from the engines. Auxiliaries consist of two electric motor driven starting air compressors and one electric motor driven and one gasoline engine driven vacuum pump. Electricity is supplied by the power company. Formerly single phase, this has been changed recently to a 15 kva 120/208 volt, 3-phase service.

Sewage enters the station through a back cleaned mechanical bar rack located in the basement. A new channel

and bar rack with the operating floor at ground floor level is being installed. Pumps discharge vertically and then horizontally, all three pumps discharging into a single special double wye branch fitting within the station. The plans show two force mains from the station to the high level sewer, one 30 inch and the other 24 inch in diameter.

During the calendar year 1971, the average flow pumped per day was 10.13 mgd, and the maximum flow pumped in 24 hours was 20.01 mgd. The maximum output with all three pumps in operation was said to be 28 mgd, due to head losses in the discharge lines.

The building is old, but appears to be well maintained. Units No. 1 and 2, the Fairbanks-Morse units, were installed in 1950 and have been in operation 60,000 hours each or 30 percent of the time per unit. In other words, assuming only one 20 mgd pump were operated at one time, this would have occurred 60 percent of the time. Unit No. 3, the 12 mgd unit, was installed in 1957 and has been in operation 80,000 hours, or approximately 57 percent of the time. It is said to be in good condition.

One Fairbanks-Morse engine was recently overhauled and the other is due for an overhaul. Both 20 mgd pumps were overhauled in 1969. The starting air compressors are also of Fairbanks-Morse manufacture and are said to be in poor condition with no replacement parts on hand. The Fairbanks-Morse diesel engines are an obsolete model and replacement parts may be hard to get. It is now impossible to obtain replacement parts off-the-shelf, and such parts on order are entered for production only when enough accumulate for a production run at a good profit. This may mean a wait of six months or more, with standby or essential equipment unavailable, unless the necessary parts are stocked by the MDC or can be manufactured by independent machine shops.

Due to the type of pumping equipment, continuous round-the-clock attendance is required, since starting and stopping of units, control of speed, and priming of pumps must be done manually. Even the charging of the starting air storage tanks is a manual operation since automatic pressure switches were not installed.

The diesel engine for Unit No. 1 should be over-hauled and put in good condition. In addition, the starting air compressors should be put in improved operating condition. If the necessary parts cannot be obtained from Fairbanks-Morse in a reasonable time, a new starting air compressor should be purchased.

Adequate electric lighting should be provided for the starting air compressor and vacuum pump areas.

The immediate improvements to be considered are listed in Table 6-2.

For the long range an alternative study of conversion of this pumping station to an automatic, unattended electric station should be made. It would include automatic standby generating or pumping capacity as well as telemetering for remote supervisory control.

In conjunction with this study, the hydraulics of the two force mains should be analyzed to insure that future peak-flows can be pumped with one of the largest units out of service.

#### Reading Pumping Station

This station serves the Town of Reading and lifts sewage from a large concrete tank a height of 48 feet with tank full or 62 feet with tank drawn down and discharges through a 16 inch force main 1,400 feet long passing under Route 128 and emptying into the Reading Extension Sewer.

The station contains two vertical shaft nonclog sewage pumps located in a pump room approximately 16 feet square with floor 44 feet below ground level, and 34 feet below basement level. Pumps operate with a positive head on the suction varying from one to 15 feet. Motors are located at ground floor level. Suction and discharge gate valves are operated by floor stands at the basement level. Cage type bar screens can be raised to basement level for manual cleaning.

Unit No. 1 consists of an 8 inch Fairbanks-Morse bottom suction nonclog pump rated 4 mgd at 80 foot head driven by a 100 hp 865 rpm G.E. wound rotor motor. The unit is started and controlled manually and is operated only at full speed.

Unit No. 2 consists of an 8 inch Morris bottom suction nonclog pump rated 4 mgd at 75 foot head with dual drive consisting of a Fairbanks-Morse two cycle diesel engine, Model 49A 4-1/2 6S rated 120 hp at 1,200 rpm driving through a right angle gear on top of which is mounted a 100 hp 1,170 rpm 440 V 3-phase squirrel cage electric motor made by Fairbanks-Morse. Change-over from electric drive to engine drive and vice-versa requires manual shifting of a clutch collar and takes one man 20 to 30 minutes. The electric motor is provided with a manual lever operated reduced voltage starter.

Alternating current is supplied by the Reading Municipal Light & Power Company.

The pump room is reached from the basement level by three flights of vertical ladders interrupted by two intermediate platforms.

During the calendar year 1971 the average flow was 2.31 mgd and the maximum flow pumped per day was 4.01 mgd. On many occasions, water rises in the sewers above the crown of the pipe and residents complain of slow flushing toilets. Sanitary sewage flows are increasing; during the last five years the pumps' operating time has tripled.

The above flows are estimated, since the station does not have a flow meter. With the minimum static head and a full collection reservoir it is probable that the peak pumping rate of one pump is considerably greater than 4 mgd.

The station was built in 1920. The structure appears to be in good condition. The station has no emergency lighting system and battery operated flashlights must be used during night-time power outages. With only one operator on duty, this makes it considerably more difficult to connect the diesel engine and get it in operation.

The electric switchboard contains open knife switches and represents a danger to the operator and others having business at the station, in case of accidental contact. Pump motor starters are manual type lever operated. The resistor bank for the wound rotor motor is located in the basement, which is badly cluttered up. The electrical installation is not up to present day standards of safety, reliability and convenience.

The diesel engine is an obsolete model and replacement parts may be difficult to obtain.

Pump No. 2 is in operation without wearing rings. A new pump has been received as a replacement and is due to be installed soon.

The screen room hoists and lighting should be explosionproof, but are not. The light is operated by a pull chain. The cage type bar racks are badly corroded and the hoists in poor shape. Screenings amounting to 3 to 6 cubic feet per day are placed in barrels and carried up the rear entry to the basement level.

The operator reports a considerable buildup of grease or scale on the inside of the discharge piping at the pumps.

The 16 inch discharge pipe rises vertically from the pump room to the basement level within the concrete wall of the station. In the basement it turns to a horizontal direction and runs as bell and spigot pipe about 4-1/2 feet above the floor to exit from the station. Several years ago, it was noticed that the 16 inch 90 degree bell and spigot elbow at the top of the vertical rise had pulled one inch out of its socket, after which the joints were strapped. The exact time and operational incident which caused the joint to pull apart was not observed or determined.

A 6 inch riser pipe from the pump discharge to the basement level is supposed to be kept full of air from an air compressor in the basement to serve as a surge suppressor since the discharge piping could be subject under certain conditions to severe waterhammer pressures. In our opinion, this arrangement is not fully effective.

When Route 128 was constructed, 500 feet of 16 inch pipe was installed to serve as a future duplicate force main from the station. This pipe has not yet been placed in service.

The station is heated by an oil fired steam boiler. The operator reports inadequate heat in the wintertime.

The operating staff consists of a superintendant and four operators for round-the-clock station attendance. This means that at nights, and occasionally on days, only one

operator is on duty. In case of an accident, this man would be helpless until his relief arrived. During the periods when only one operator is on duty, an hourly police check by telephone or squad car should be instituted.

Improvements needed are summarized in Table 6-2. Replacement of Pump No. 2 should be carried out as planned along with increase in pumping capacity. Extension of the duplicate force main under Route 128 to the full 1,400 feet in length should be made and the existing main should be put in service for increased capacity and reduced head losses.

Also, a plan should be developed to rehabilitate the station for automatic control of a modern installation of three electric driven pumps to handle future peak flows with one unit out of service. Automatic lead front electrical controls, and new screens should be included. Water-hammer conditions for power failure with two pumps operating at minimum suction level, including water column separation at the top of the discharge riser, should be studied to insure proper protective measures.

The alternative of a new automatic electric station should also be studied.

## Squantum Pumping Station

This pumping station pumps sewage from the Squantum section of Quincy to the MDC High Level Sewer through a long force main.

The pumping station is very old and originally pumped sewage to the nearby Boston Main Drainage Works. However, with the abandonment of Boston's Moon Island facilities, diversion to the Nut Island Treatment Plant was necessary.

The capacity of the Squantum Pumping Station will need to be appreciably increased to meet year 2000 needs. The space available for additional pumping equipment is extremely limited and will require the expansion of the present dry well portions of the structure if additional pumping equipment is to be properly accommodated. Given the age of these facilities, the limitations and condition of the equipment, replacement of this pumping station with new facilities of appropriate capacity and designed to meet current engineering standards would appear warranted. Preliminary site investigations indicate that suitable areas near the existing facilities are available for new construction.

#### Costs of Recommended Improvements

Improvement needs for each of the pumping stations are listed in Table 6-2.

Estimated costs for the rehabilitation or replacement of the pumping stations are shown in Table 6-3.

TABLE 6-3. ESTIMATED COST FOR REHABILITATION OR REPLACEMENT OF MDC PUMPING STATIONS

Pumping station	Work	Estimated cost
Alewife Brook	Rehabilitate	\$ 712,000
Braintree-Weymouth	Replace	2,920,000 <sup>(1)</sup>
Charlestown	Replace	6,000,000 <sup>(1)</sup>
East Boston Steam	Replace	1,460,000 <sup>(2)</sup>
East Boston Electric	Rehabilitate	365,000
Hingham	Rehabilitate	890,000
Houghs Neck	Replace	203,000
Quincy	Replace	2,220,000(1)
Reading	Replace	3,042,000 <sup>(1)</sup>
Squantum	Replace	1,350,000

<sup>1.</sup> Includes necessary force mains.

Costs are based on January 1975 costs for the Boston area at General Construction Engineering News Record (ENR) cost index of 2200.

All costs relating to the repair, rehabilitation or reconstruction at pumping facilities include the cost of materials, labor, installation, testing, engineering and an allowance of 50 percent for contingencies.

<sup>2.</sup> Based on serving East Boston only.

#### CHAPTER 7

#### HEADWORKS ANALYSIS AND IMPROVEMENTS

#### General

The following existing headworks are discussed in detail in this chapter:

Chelsea Creek

Ward Street

Columbus Park

Winthrop Terminal Facility

All of these facilities are of recent design and construction. The Chelsea Creek, Columbus Park, and Ward Street headworks were placed in operation in 1968, and the Winthrop Terminal Facility was placed in operation in 1970. All of these facilities provide pretreatment -- coarse and fine screening, and grit removal -- for the wastewaters discharged to the Deer Island Treatment Plant. The Chelsea Creek Headwork is connected to the Deer Island main pumping station by a deep rock tunnel approximately four miles in length. The Columbus Park and Ward Street headworks are connected to the same pumping station through a separate deep rock tunnel approximately seven miles long. The Winthrop Terminal Facility is located on the site of the Deer Island Treatment Plant and is designed to normally discharge wastewaters directly to the primary sedimentation tanks of that facility.

Appendix G presents an inventory of major equipment in each of the headworks.

#### Description of Facilities

The Chelsea Creek, Columbus Park and Ward Street headworks contain bar racks and grit collectors for pretreatment of the wastewater before it is discharged to the Deer Island Treatment Plant. At each installation, the flow through each grit chamber is measured by a Parshall flume which permits velocity control in each grit chamber. The Columbus Park and Ward Street headworks are equipped with both coarse and fine bar screens. However, operating experience has indicated that the coarse bar screens are not required, and it is anticipated that they will be removed in the near future. Flow through the headworks is by gravity.

Wastewater entering the Winthrop Terminal Facility passes through coarse and fine bar racks and is pumped to a

Parshall flume, then flows by gravity through aerated grit chambers to the Deer Island Treatment Plant. With completion of the installation of two 60-mgd pumps that have been moved from the old Deer Island Pumping Station, this facility has an installed pumping capacity of 180 mgd. The discharge piping from the two 60-mgd pumping units is designed so that these pumps may discharge either to the grit chambers or to the treatment plant bypass conduit. Flows that are discharged to the treatment plant are measured by the Parshall flume.

Particulars relating to the principal equipment at each of the headworks is presented below:

#### Chelsea Creek Headworks

- 4 Fine bar screens 12 feet-0 inches wide by 10 feet-9 inches deep.
- 8 Grit collectors, two in each of four channels.
- 8 Inclined screw conveyors, two in each of four channels, 16-inch diameter, 8-inch pitch screw, capacity of 2 cubic yards per hour at 15 rpm (revolutions per minute).
- 4 Horizontal screw conveyors, one in each of four channels, 12-inch diameter, 12-inch pitch screw, capacity of 4 cubic yards per hour at 4 rpm.
- 4 Grit ejectors, pneumatically controlled, capacity of approximately 30 cubic feet at 100 psi (pounds per square inch).
- 1 Grit storage hopper.

#### Columbus Park Headworks

- 4 Coarse bar screens 8 feet-0 inches wide by 8 feet-7 inches deep, mechanically cleaned, 3-1/2-inch clear opening.
- 4 Fine bar screens 10 feet-6 inches wide by 8 feet-11 inches deep, mechanically cleaned, 3/4-inch clear opening.
- 8 Grit collectors, two in each of four channels.
- 8 Inclined screw conveyors, two in each of four channels, 16-inch diameter, 8-inch pitch screw, capacity of 2 cubic yards per hour at 15 rpm.

- 4 Horizontal screw conveyors, one in each of four channels, 12-inch diameter pitch screw, capacity of 4 cubic yards per hour at 4 rpm.
- 4 Grit ejectors, pneumatically controlled, capacity of approximately 30 cubic feet at 100 psi.
- 1 Grit storage hopper.
- 4 Screenings ejectors, pneumatically controlled, capacity of approximately 12 cubic feet at 100 psi.
- 1 Screening storage hopper.

## Ward Street Headworks

- 4 Coarse bar screens 8 feet-0 inches wide by 9 feet-1 inch deep, mechanically cleaned, 3-1/2-inch clear opening.
- 4 Fine bar screens 10 feet-6 inches wide by 9 feet-4 inches deep, mechanically cleaned, 3/4-inch clear opening.
- 8 Grit collectors, two in each of four channels.
- 8 Inclined screw conveyors, two in each of four channels, 16-inch diameter, 8-inch pitch screw, capacity of 2 cubic yards per hour at 15 rpm.
- 4 Horizontal screw conveyors, one in each of four channels, 12-inch diameter, 12-inch pitch screw, capacity of 4 cubic yards per hour at 4 rpm.
- 4 Grit ejectors, pneumatically controlled, capacity of approximately 30 cubic feet at 100 psi.
- 1 Grit storage hopper.
- 4 Screenings ejectors, pneumatically controlled, capacity of approximately 12 cubic feet at 100 psi.
- 1 Screening storage hopper.

## Winthrop Terminal Facility

3 - Coarse bar screens 4 feet-0 inches wide by 9 feet-6 inches deep, mechanically cleaned, 3-1/2-inch clear opening.

- 3 Fine bar screens 4 feet-0 inches wide by 9 feet-6 inches deep, mechanically cleaned, 3/4-inch clear opening.
- 2 Elevating grit collectors, one in each of two chambers.
- 1 Horizontal grit screw conveyor 9-inch diameter, capacity of 200 cubic feet per hour.
- 1 Screening discharge hopper, capacity of approximately 12 cubic feet.
- 4 Electric driven, vertical nonclogging, single end suction, centrifugal or mixed flow-type pumps, each with a capacity of 10,400 gpm (gallons per minute) at 600 rpm against a total dynamic head of 30 feet.
- 2 Diesel-driven pumps, each capable of pumping 60 mgd (presently being installed).
- 3 Aeration blowers 75 hp, 550 rpm, each having a capacity of 1,700 cfm (cubic feet per minute).
- 2 Grit chamber blowers 15 hp, 900 rpm, each having a capacity of 100 to 270 cfm.
- 2 Ejector air compressors 25 hp, 870 rpm, two-stage, three-cylinder, 142-cfm piston displacement.

## Operating Data

A summary of operational data for each of the head-works covering the period July 1, 1971 to June 30, 1972 is presented in the following table:

TABLE 7-1. HEADWORKS PRETREATMENT FLOW DATA

			12.75		in recent case from a
Flows, mgd	Chelsea Creek	Columbus Park	Ward Street	Winthrop facility	Totals
Minimum hourly rate	62	22	30	0	
Minimum 24 hours	s 86	55	67	1	
Average daily	146(1)	77 <sup>(1)</sup>	101	5	329
Average daily (Design)	(140)	(66)	(113)	(24)	(343)
Maximum 24 hou <b>r</b> s	266	150	170	23	
Maximum hourly rate	330	205(1)	280	53	
Maximum hourly rate (Design)	(350)	(182)	(256)	(60)	
Total for year, mil gal	53,473	28,098	36,882	1,770	120,223

<sup>1.</sup> Higher than design flow due to inflow, especially salt water inflow (see Technical Data Vol. 2).

The inspection of the Chelsea Headworks indicated that the back-cleaned bar screen wiper bars need adjustment or redesign to provide a metal to metal shearing action to prevent screenings being carried over the top and washed off behind the screen. As estimated, 15 percent of the screenings bypass the bar racks in this manner.

When visited, only one (of the four) grit chambers was in operation, handling a flow of 125 mgd. The estimated velocity in the grit chamber was in excess of one foot per second. The screw conveyors indicated no grit was being removed, but, of course, most of the grit is collected at times of storms. However, it was noted that the rate of grit removal at this location decreased from 0.76 cubic feet per million gallons in 1971 to 0.56 cubic feet per million gallons in 1972. This compares with decreases at the other headworks of less than 5 percent between the same years.

## Rehabilitation Needs

Since the Winthrop Terminal Facility is of very recent construction, this facility has no need for any rehabilitation work.

All of the headworks are of modern design and are in conformance with sound engineering practice. However, due to the functions that they perform, the equipment within them is subjected to very abrasive action by grit and corresive action by sewage. Accordingly, it can be anticipated that the need for equipment repair will occur frequently, and correspondingly, the maintenance budget for the headworks should be made adequate to provide for these needs.

Inspection of the headworks indicate that the fine screen cleaning mechanisms, the inclined and horizontal grit collectors and the grit ejectors and valves associated with them are in need of repair at all of the facilities.

At all of the headworks, difficulties have been experienced with the pneumatic grit ejection systems because of rapid erosion of the discharge piping, particularly at bends; line stoppages, and the disposition of grit at valve locations. Because of the general operational difficulties that have been experienced with these systems, it would appear warranted to review the design of these facilities, and to determine if the piping is of suitable material for this type of service. Based on this review, alterations might be suggested which would help in minimizing the difficulties now experienced.

Screenings at the Ward Street Headworks are conveyed pneumatically to a hopper from which the screenings are trucked to Deer Island for landfill disposal. Since the pneumatic system at Columbus Park is not used due to the condition of the ejectors, the screenings are bagged before they are trucked to Deer Island. At the Chelsea Headworks, the screenings are manually collected and loaded on a truck for disposal at Deer Island. The present operational situation indicates that there is some need for repairs, and perhaps, a review of the operational procedures to determine the most feasible method of collecting the screenings at each headworks.

# Capacity Requirements

Five conceptual plans have been investigated to determine the best method of providing for the future sewerage needs of 109 Eastern Massachusetts Metropolitan

Area communities. However, interceptor, pumping station and headworks improvement requirements are identical in Concepts 4 and 5. Under these concepts, the existing limits of the Deer Island service area will be either expanded slightly or undergo varying degrees of contraction. Correspondingly, the total service area tributary to the headworks vary. Therefore, the total future design capacity requirements for the headworks vary depending on the conceptual plan under consideration.

Table 7-2 sets forth for each of the headworks the present design capacity of the facility and for each conceptual plan the estimated capacity requirements for 2000. The capacity requirements are based on peak dry weather flows that are expected to occur by 2000.

It is to be noted that the estimated peak 2000 dry weather flows presented in Table 7-2 for the Columbus Park Headworks and the Winthrop Terminal Facility remain constant under all conceptual plans because the tributary areas to these facilities do not vary. The estimated peak 2000 dry weather flows do vary in the case of the Chelsea Creek and Ward Street headworks, and are at a maximum under Concepts 1 and 3.

Under the Recommended Plan, flows tributary to the headworks facilities are similar to those under Concepts 1 and 3 as shown.

Comparison of the design capacity of each headworks with the estimated 2000 capacity requirements indicates that each headworks, with the exception of Ward Street, has sufficient design capacity to handle estimated 2000 peak dry weather flows. Although the design capacity of the Ward Street Headworks is given as 256 mgd, this facility has been reported to have operated satisfactorily at rates of flow up to 285 mgd. Based on this operational experience, the Ward Street Headworks appears to have sufficient capacity for the projected year 2000 needs.

The estimated 2000 peak flows given in Table 7-2 for the Winthrop Terminal Facility assumes that the service area for that facility will be limited to Winthrop, Orient Heights, and East Boston. However, as noted in the previous chapter, at times an excess of 100 mgd may be diverted to this facility from the Chelsea Headworks through the East Boston Steam or Electric pumping stations. At such times, the Winthrop Terminal Facility would be required to handle flows up to the reported capacity of the North Metropolitan Trunk Sewer or on the order of 100 to 125 mgd. With the two 60-mgd pumps now being installed, there will be sufficient pumping capacity to handle flows of this magnitude, with the largest pumping unit out of service. The grit

TABLE 7-2. FUTURE CAPACITY REQUIREMENTS FOR HEADWORKS UNDER PEAK DRY WEATHER FLOWS - FOR THE YEAR 2000

	Peak		Capacity requirements year 2000 peak dry weather flows, (mgd)	quirements	s year 200	0.0	
Ucoducal	capacity,	Con-		Con-	Con-	Recommended plan	27 6
Chelsea Creek	350	350		350	194	350	
Columbus Park	182	176	176	176	176	176	
Ward Street	256	797	189	797	189	264	
Winthrop Terminal Facility	(1)	25	25	25	25	25	

1. Total installed pumping capacity 180 mgd.

chambers, which have a design capacity of approximately 60 mgd, are located downstream of the pumping station and are not designed to handle the total installed capacity of the pumping facility. This is because it is planned to divert, after pumping, any excess flow beyond 60 mgd to the bypass conduit rather than routing any excess flow through the grit chambers and the treatment plant. It is doubtful that bypassing of excess flow wastewaters will be acceptable to the regulatory agencies. For short-range planning, grit removal and chlorination treatment facilities should be provided for any excess flows. For long-range planning, consideration should be given to routing all flows from the Winthrop Terminal Facility to the Deer Island Treatment Plant when the treatment plant is expanded to meet future needs. These recommendations are contingent on the fact that future studies will indicate that diversion of excess flows to the Winthrop Terminal Facility from the Chelsea Headworks through the East Boston Pumping Stations and the North Metropolitan Trunk Sewer is recommended.

Although each of the headworks is estimated to have sufficient capacity to meet 2000 peak dry weather flow needs, under present conditions they do not have sufficient capacity to handle peak inflows. This is because they all receive large quantities of storm inflow since they serve extensive combined sewered areas. The situation at some of the headworks is further aggravated by the saltwater inflow that is received due to faulty operating tide gates. However, this situation is now being corrected through a tide gate repair and replacement program which is discussed in Technical Data Vol. 2.

Presently, excess flows tributary to the Ward Street and Columbus Park headworks up to the capacity of the existing systems back up in the Charles River Valley Sewer or in the Columbus Park connection to Boston's Dorchester Interceptor. At such times, the excess flow in the Charles River Valley Sewer up to the capacity of the existing system is diverted to the B.U. storm detention and chlorination station temporary storage or for treatment before discharge to the Charles River. When the depth of flow in the Columbus Park Headworks connection reaches an excessive level, the Calf Pasture Pumping Station is placed in operation and excess flow up to its capacity is diverted to a large sewer and thence to the Moon Island tanks by gravity. At Moon Island, these flows are intended to be stored and discharged only during the outgoing tide. As previously noted, excess flows at the Chelsea Creek Headworks up to the capacity of the North Metropolitan Trunk Sewer are diverted to the Winthrop Terminal Facility. Inflows to

the various sewers beyond the capacity of the above systems overflow into various receiving waters through the numerous combined sewer overflows as discussed in Technical Data Vol. 7.

It would be very costly to increase the capacity of the headworks to provide for peak storm inflows. This is because the headworks, tunnels and the Deer Island Treatment Plant into which they discharge have been designed to operate integrally, handling only flows slightly greater than peak dry weather flows. To increase the design capacity of the headworks for all inflows would require a large increase in capacity of the tunnels which serve them. Furthermore, it is not likely that elimination of inflows by complete separation of the combined systems that are served by the headworks will be economically and environmentally justifiable. For these reasons, it would seem prudent to continue the present mode of operation of these facilities at times of storm inflow until combined sewer overflow regulation plans are implemented. However, the existing facilities of the Calf Pasture Pumping Station should be upgraded to provide modern mechanically cleaned racks and grit chambers ahead of the pumping station, and the storage tanks at Moon Island should be equipped with skimming and chlorination facilities. The Winthrop facility should also be upgraded to provide facilities that will permit degritting and disinfection of all flows that pass through that facility, if studies indicate that excess flows should be diverted to that facility.

For long-range planning, excess flows should be handled as part of the overall combined sewer overflow regulation plan.

# Costs of Recommended Improvements

Since all of the headworks facilities are new and their recommended improvements are not large in scope, estimated costs for the necessary repairs at the headworks facilities have not been determined as it is felt that detailed in-depth engineering analyses are required before any specific recommendations and estimates can be made. Many of the minor repairs required by the existing equipment can in all probability be rectified by expansion of the maintenance budget. Specific work item costs can only be identified by a detailed engineering analysis.

APPENDIX A INTERCEPTOR DATA

### APPENDIX A

#### INTERCEPTOR DATA

In connection with the analysis of the MDC interceptor system for adequacy, the physical properties of each section of the interceptor system were collected from MDC files and construction drawings. Any modifications to the interceptor system that were made after they were originally built were also obtained. Table A-1 lists all pertinent interceptor data for the North Metropolitan Sewerage System tributary to the Deer Island Treatment Plant. Table A-2 lists all pertinent interceptor data for the South Metropolitan Sewerage System contributing flow to the Nut Island Treatment Plant. Table A-3 explains the abbreviations used in Tables A-1 and A-2 relating to community and interceptor names.

Tables A-1 and A-2 are arranged in accordance with MDC sewer section numbers for easy reference and retrieval of any additional data from MDC files which are arranged on a similar basis. These tables show for each sewer segment the MDC section number; the community in which it is located; its stations and inverts; its size, s. pe, length, slope and area; and its selected Manning's frict on factor along with its capacity both in cubic feet per second and million gallons per day.

For the location of each of those sewers and their names, see Figure 2-2.

TABLE A-1 WEC INTERCEPTORS NORTH SYSTEM

SEC.	٦٥ ٦	FROM	144641	STATION	NVERT (F.1)	S176 (1N)	S HADE	E C	5.336	A 2 E A ( SQ= T)	2 77	C4 PACI TY	(MGD)
r,	5	19+30.00	92.36	24+30.00	92.56	101	CINCULAR	500.00	0.000.00	63.62	910.	203.40	131.45
m	10	00.00+0	95.56	3+41.00	19.50	108	CIRCULAR	361.00	0.300364	63.62	.016	177.30	114.59
n	12	3461.00	92.67	7+85.00	18.00	108×111	EXT. CIPCLE	424.00	0.000330	65.87	.016	193.60	125.12
•	10	7+85.00	92.81	10+ 70.00	92.90	100	CIRCULAR	285.60	0.000315	63.62	• 10 •	179.90	115.27
n	5	10+70.00	92.90	26+33.00	93.57	108X111	EXT. STRCLF	1563.00	0.303428	65.87	.016	220.50	142.50
3.5	OI NTP	0+85.25	93.57	4+30.00	94.84	73.50	SIPHON	344.75	0.003683	29.45	• 01 6	155.50	100.50
	410	0+00+0	94.84	10+26.90	95.16	106	CIRCULAR	1026.00	0.000.0	63.62	• 010	179.90	115.27
	410	10+24.00	95.16	11+17.00	95.18	107×110	OVAL	91.00	0.000219	06.99	.016	154.50	99.85
	51.	11+17.00	95.18	12+11.00	95.22	107×112	CVAL	00.40	04000425	66.04	910.	220.30	142.38
•	419	12+11.00	95.22	13+32.00	95.26	107×110	OVAL	121.00	0.000155	64.90	910.	134.10	19.68
	918	13+32.00	95.26	13+55.00	95.26	107×112	OVAL	21.00		66.04	• 10 •		
	eT.	13+55-00	95.26	21+73.00	95.52	107×110	DVAL	818.00	0.000317	64.90	910.	184.20	119.04
	419	21+73.00	95.52	41+21.00	11.90	197×112	CVAL	1948.00	0.000313	66.04	910.	189.60	122.53
	57	41+21.00	96.13	57+11.00	96.62	107×110	OVAL	1590.00	0.000303	06.90	910.	181.20	117.111
9	eT.	0+00+0	96.62	1+48.00	19.96	108x110	OVAL	148.00	0.000337	65.12	910.	192.80	124.60
s	WIP	1+48.00	26.67	8+67.00	68.90	108	CIRCULAR	719.00	0.000305	63.62	910.	177.60	114.78
r	473	8+67.00	96.99	10+77.00	96.96	109x110	OVAL	210.00	0.000333	65.12	910.	191.60	123.83
s	419	10+77.00	96.96	14+82.00	97.08	109×112	OVAL	405.00	0.000296	66.62	• 10 •	108.00	69.80
n	<b>4</b> TP	14+82.00	97.08	14+90.00	60.16		TPANSIT TON	8.00	0.001250				
5	eT.	14+90.00	97.09	17+54.00	97.17	102×110.50	HORSESHOE	264.00	0.000303	66.20	910.	186.60	120.60
v	67.	17+54.00	97.17	24+25.00	97.38	102×112	HOSSESHOE	671.00	9.000312	67.29	910.	194.10	125.44
'n	919	24+25.00	97.38	24+45.00	97.39		TRANSIT TON	20.00	0.000500				

TABLE A-1 MCC INTERCEPTORS NORTH SYSTEM

Z O Z	רטכ	15	FROW	1 N V F F T	STATION	1 N V F H T	1715 (11)	SHADE	LENGTH (FT)	\$_0.5	A35A M. (50°F)	2 7 7	CAPACITY (C=S) (	( MGD )
v.	5	24+	24+45.00	51.30	25+35.00	97.41	108×110.5	CVAL	03.06	0.300322	. 15.51	910.	154.70	103.21
s)	WTD	25+	25+35.00	1 4.70	00.05+45	54.10	109×112	OVAL	174.00	0.000384	. 66.02	910.	211.90	135.95
S	51.	26+	26+36.00	51.45	26+44.00	97.45		TPANSIT ION	5.00					
5	5	26+	26+44.00	94.70	41+16.00	16.70	102×110.5	HC4SESHOT	1471.00	0.000312	56.20	910.	189.00	122.53
v.	cT	414	41+15-00	16.72	42+32.00	97.04	1C2×108	CVAL	117.00	0.030256	64.42	910.	153.60	107.02
v,	at.	454	42+32.00	46.72	42+50.00	94.16	106	CIRCULAR	18.00	0.300555	63.62	910.	240.33	155.30
ď	o L	45+	42+50.00	97.05	00.00 +++	40.80	106	CIRCULAR	350.00	0.000314	63.62 .	910.	179.90	115.27
·	cT.	•0	50.00+0	90.86	4+75.00	15.80	108	CIRCULAP	4 75.00	0.000315	63.62	.016.	173.90	116.27
•	d T	•	4+75.09	98.21	20+13-00	69.85	108×110.5	EXT. CIRCLE	1538.00	0.000312	65.51	910.	185.90	120.79
•	cT.	5u+	20+13.00	98.69	23+33.00	98.70		TPANSITION	20.00	00.0000.0				
v	.73	20.	20+33.00	C1.42	41+12.00	99.35	102 x110 .5	HOMESTERNE	2079.00	0.300312	66.20	.016	189.60	122.53
1,	51.	+ 0 a d	0000000	66.33	3+ 70.00	99.00	102X110.5	HORSESHOR	370.00	0.000297	66.20	910.	184.70	113.37
1	ct.	re 3+	3+70.00	44.65	2+90.00	100.87	3-57	NOHAIS	20.00	0.071500	53.13	.016	304.90	197.05
1	ct.	FP 5+	00.05+5	166.87	6+90.00	100.87		SANDCATCHER	100.00					
1	at *	EP 6+	00.06+9	100.87	8+4 P. OC	100.89	102×110.5	HOR SESTOF	158.00	0.000126	66.20	910.	120.30	27.75
a	5	• 0	00.00+0	100.92	00.00.00	101.02		DROP MANHOLE	5.00	0.020000				
ď	a	į	00.50+0	100.92	3+13.00	101.02	102×11C.5C	HORSESANS	313.00	0.000319	66.20	910.	191.40	123.70
Œ	9	34	3+13.00	101.02	3+49.00	101.03		TPANSIT ION	36.00	0.000277				
æ	9	34	3+49.00	101.03	33+47.00	102.03	108×110.50	EXT. CIRCLE	2 99R. 00	0.000333	65.12	910.	191.60	123.83
•	8	734	33+47.€	102.03	31+57.00	102.04		TRANSITION	10.00	0.001000				
Œ	è	334	33+57.00	102.04	34+08-00	102.04	120×96	HCRSESHOE	51.00	201000.0	63.36 .	910.	200.10	129.32
æ	a.	14.	74+0P-CC 102.05	102.05	36+68.00	102.14	108×110.50	EXT. CIPCLE	550.00	0.000307	65.12	910.	184.00	118.92

TABLE A-I MCC INTERCEPTORS NORTH SYSTEM

SFCT	רפע	STATION	INVERT (FT)	TO STATION	INVERT (FT)	S17E (1N)	SHAPE	LENGTH (FT)	SLOPE	( SQ = T)	2 7 7	CAPACITY (C=S) (	(MGD)
	£	36+68.00 102.14	102.14	37+00-00	102.15	120 x96	HORSESHOF	32.00	0.000312	63.36	•016	178.50	115.36
•	•	37+00-00	102.15	37+20.00	102.16		TRANSITION	20.00	0.000500				
•	£	37+20.00	102.16	41+30.00	102.30	102X110.5	HORSESHOE	410.00	0.000341	66.20	910.	197.90	127.90
•	£	0+00+0	102.27	13+55.00	102.72	102X110.5	HORSESHOF	1355.00	0.000332	66.20	.016	195.60	126.41
•	83	13+55-0 0	102.72	13+75.00	102.73		TRANSITION	20.00	0.000500				
•	83	13+75.00	102.73	33+82.00	103.40	108×110.50	EXT. CIRCLE	2007.00	0.000333	65.49	910.	192.80	124.60
=	ž	00.00+0	96.72	30+39.00	100.52	25 x 3 €	CATENAPY	3039.00	0.001250	4.83	910.	11.50	7.43
12	<b>.</b>	0+00+0	88.64	30+33.70	90.06	100×110.50	BASKT HAVOLE	3033.70	0.000468	64.80	910.	225.20	145.54
:	ž	00.00+0	90.06	5+4 A. 00	90.24	100×110.50	BASKT HANDLE	548.00	0.000328	64.80	910.	1 90.00	122.79
:	CF.	5+48.00	90.24	9+19-00	15.06	106	CIRCULAR	371.00	0.000350	61.24 .	910.	183.80	116.85
:	Ę	9+19.00	90.37	12+19.00	14.06	106×106.50	OVAL	300.00	0.000333	61.58	910.	177.40	114.65
:	£	12+19.00	74.06	16+71.00	90.62	106	CIRCULAR	452.00	0.000331	61.24	910.	175.30	113.94
:	£	16+71.00	90.62	16+90.00	90.62		TRANSIT ION	19.00					
•	3	16+90.00	. 90.62	17+48.00	49.06	106×110.50	DVAL	58.00	0.000344	67.58	910.	201.50	132.23
:	ŧ	17+48.00	+9.06	17+61.00	90.65	106×112.50	OVAL	13.00	0.000769	69.08	910.	314.90	203.51
:	ž	17+61.00	90.65	18+18.00	19.06	106×110.50	CVAL	57.00	0.000350	67.58	910.	205.40	133.39
•	£	18+18.00	19.06	20+02-00	90.73	106×110.50	DVAL	184.00	0.300271	67.58	910.	181.60	117.36
:	4	20+02-00	90.73	21+24.00	77.06	106	CIRCULAP	122.00	0.300327	61.24 .	910.	175.30	113.94
:	<b>4</b> 5	21+24.00	44.06	25+05.00	69.06	1 00×114	BASKT HANDLE	381.60	0.000314	67.23	•016	193.80	125.25
:	C#	25+05.00	90.89	32+09-00	91.13	100×108.50	BASKT HANDLE	704.00	0.000340	63.41	910.	184.40	119.17
:	ž	32+09-00	91.13	31+02.00	91.16	100×110 •50	BASKT JANDLE	93.00	0.000322	64.80	910.	185.80	120.72
:	<b>±</b>	33+02+00	91.16	33+32.00	91.17	100×108.50	BASKT HANDLE	10.00	0.000333	63.41	910.	184.40	119.17

TABLE A-1 MCC INTERCEPTORS NORTH SYSTEM

SFCT	707	FROM STATION	INVERT (FT)	STATION	INVERT (FT)	512E (1N)	SHADE	LENGTH (FT)	S_0.7F	AREA (50= T)	77	CAPACITY (CFS) (N	(MGD)
:	CHE	33+32.00	91.16	33+42.00	01.30		THANSITION	10.00	0.014000				
:	£	33+42.00	91.30	34+44.58	91.34	99X106	PASKT HAVOLE	102.58	0.000389	60.37	9 10 •	187.20	120.98
15	CH	0+00+0	91.34	17+54.00	91.92	98×106 •50	SASKT HANDLE	1754.00	0.000330	60.71	910.	173.20	112.58
-1	EVF	00.00.0	91.92	21+06-00	05.62	98x106 .50	BASKT 4ANDLE	2106.00	0.000332	60.71	910.	174.20	112.58
16	FVF	21+06-00	92.62	21+70.00	92.64	98×108 .50	BASKT HANDLE	64.00	0.000312	62.08	910.	176.40	114.00
16	FVE	21+76-60	99.20	32+00.00	66.50	98×136 .50	BASKT HANDLE	1030.00	0.0000339	12.09	910.	174.20	112.58
16	FVE	32+00.00	66.36	33+90.00	93.02	98X108.50	BASKT HANDLE	00.06	0.000333	62.08	910.	182.30	117.82
91	FVF	32+50.00	93.02	35+72.16	03.11	98X136.50	PASKT HAVDLE	242.16	C.303318	12 .09	910.	170.20	110.00
16	EVE	35+72.16	92.11	35+88.25	03.12		RELLMOJTH	16.09	0.000621				
16	n v	35+ 88.25	93.12	44+30.66	94.17	70×76.50	BASKT HANDLE	14.5.41	0.001246	31.14 .016	.010	133.60	89.57
11	EVE	0 -00 - 0	94.17	32+92.00	95.28	70×7F	PASKT HANDLE	1292.00	0.000337	31.10 .016	910.	71.60	46.27
11	EVF	32+62.00	95.28	33+05.00	96.02		PELLMOJTH	13.00	0.056923				
11	EVE	33+05.00	96.02	35+27.50	96.17	56 x51 . 50	RASKT HANDLE	222.50	0.000674	19.94 .016	.016	56.20	36.32
17.5	EVE	0+00.00	56.17	16+27.00	97.34	56 x61 • 50	PASKT HAYDLE	1427.00	0.000119	19.90 .016	910.	57.80	37.35
0	EVE NFD	0+00+0	45.72	4+21.00	98.00	9	NUHUIS	421.00	0.156769	12.57 .016	.016	43.47	29.09
20	MFD	0.0000	98.20	S+ KR. 30	98.63	55 X61	PASKT HANDLE	568.00	0.000757	19.75 .016	910.	98.00	37.91
20	C JM	5+68.00	98.63	7+03-00	98.70	6.0	CIRCULAR	135.00	0.000518	19.64 .010	010.	43.20	31.15
50	CJ	7+03.00	98.70	13+90.00	99.20	19x55	GASKT HAVDLE	697.60	7270000.	19.75 .016	. 01 6	37.40	37.10
20	MFJ	13+00.00	00.20	74+11.00	103.20	53×56	BASKT HANDLE	6221.00	0.000642	17.14 .016	910.	44.80	28.95
2068	MFD	69.00+0	64.45	15+36.00	101.24	76	CIRCULAP	1530.00	3.301673	3.14 .016	910.	7.52	4.86
21	450	0+00•0	107.20	14+65.00	104.40	53 X 5 to	HASKT HANDLE	1865.00	0.000643	17.14 .016	.016	44.80	28.95
21	46.3	18465.00	104.40	25+95.00	104.17	51×56	HASKT HANDLE	730.00	0.000506	17.14 .016	910.	39.50	25.53

TABLE A-1 MCC INTERCEPTORS NORTH SYSTEM

104.77	20+46.00 20+46.00 20+56.00 29+85.00	108.91	51 X 54							
108.91	7+90.00 3+56.00 3+85.00	108.91		BASKT HANDLE	5675.00	0.000499	15.88	.010	35.80	23.14
105.04	3+86.00 3+85.00 3+83.00	109.04	40×42	BASKT HANDLE	1790.00	0.000731	10.26	9 10 .	24.00	15.51
105.04	)+56.00 9+85.00 0+33.00		40 X42	BASKT HANDLE	256.00	0.000507	10.26	•10.	20.03	12.94
105.05	9+85.00	109.05		PEDUCER	10.00	0.0010000				
105.51	0+33.00	109.51	40×04	BASKT HANDLE	00.626	0.000495	10.82	9 10.	23.91	13.51
		1111.03	40 X42	BASKT HANDLE	3048.00	0.000498	10.26	910.	19.80	12.80
0+00.00 94.05 22	22+67.73	95.18	72×80.50	BASKT HANDLE	2267.73	0.000458	33.60	910.	97.00	65.69
0+00.00 95.18 23	23+32.00	96.35	*2×80	BASKT HANDLE	2332.00	0.000501	33.50	9 10.	97.00	65.69
0+00.00 96.35 1	1+74.00	96.41	72 X 8 0	BASKT HANDLE	174.00	0.000344	33,35	.016	83.40	96 • 19
1+74.00 96.41	1+94.00	96.41		TRANSITION	20.00					
1+94.00 96.41 2	2+20.00	96.42		TRANSITION	26.00	0.000384				
2+50.00 96.42	3+35.00	96.42	72 X 85	BASKT HANDLE	115.00		35.85	• 010		
3+35.00 96.42	3+96.58	15.96		PUMP STATION	61.58	0.001461				
3+96.58 96.51 15	15+36.40	88.49	99	SIPHON	1139.82	0.007036	19.64	910.	159.80	103.28
2+00.00 88.49	5+10.00	88.59	79.5x89.25	CATENARY	310.00	0.000322	38.81	• 10 •	94.87	61.31
5+10.00 88.59	7+85.35	88.68	77×86	CATENARY	275.35	0.000326	36.10	9 10 •	85.10	55.64
0+00.00 88.68	5+27.00	89.20	77 X 86	CATENARY	527.00	0.000986	36.10	910.	150.00	96.96
5+27.00 89.20 42	42+33.37	90.63	89X76	CATENARY	3706.37	0.000388	29.45	• 01 6	71.30	46.08
0+00.00 90.63 12	12+23.00	91.10	85×78	CATENARY	1223.00	0.000384	29.45	• 01 6	71.20	46.02
12+23.00 91.10 12	12+37.00	91.11		TRANSITION	14.00	0.000714				
12+37.00 91.11 24	24+04.00	91.64	62×69	CATENARY	1167.00	0.000454	23.37	910.	62.30	40.26
24+04.00 91.64 24	24+16.00	91.64		BELLMOJTH	12.00					

TABLE A-1 MCC INTERCEPTORS NOWTH SYSTEM

2.4         CAL         CAL <th>SECT</th> <th>רעכ</th> <th>FROM</th> <th>INVERT (FT)</th> <th>STATICN</th> <th>INVERT (FT)</th> <th>\$12E (IN)</th> <th>SHADE</th> <th>- ENGT I</th> <th>S_0.3F</th> <th>(50=T)</th> <th>NAA</th> <th>CES)</th> <th>(MGD)</th>	SECT	רעכ	FROM	INVERT (FT)	STATICN	INVERT (FT)	\$12E (IN)	SHADE	- ENGT I	S_0.3F	(50=T)	NAA	CES)	(MGD)
CAM		SON CAN		91.64	47+77.00	93.04	65×69	CATENAFY	2361.60	0.000592			52.30	40.26
CHA         CHENDRAMON CONTRACT         CATENARY         FEDDRAMON CONTRACT         FEDDRAMON CONTRACT	1	SC4 CAN		93.04	47+93.00	92.72		RESULATOR	16.00					
CHA         CHA <td>80</td> <td>***</td> <td></td> <td>03.04</td> <td>00.00.00</td> <td>94.21</td> <td></td> <td>DRIP MANHOLE</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	80	***		03.04	00.00.00	94.21		DRIP MANHOLE						
CAM         13550.00         07777         17755.00         07705         07705         07705         07707         07705         07707         07705         07707	a	CAM	00.0000	94.21		97.16	48 X 8 4	CATENARY	6503.10	0.000453			29.30	18.94
CAM         17475-00         GF.10         GALTO         TRANSITITIN         9-CO         0-011111           CAM         17475-00         GF.10         GALTO         GALTO         CATELNAY         1312-00         C-000564         12-12-00         27-03           CAM         1046-00         GR-86         GALTANAY         1312-00         C-000669         12-12-00         27-03           CAM         1046-00         GR-96         E1+57-34         100-34         GAZAGA         CATENARY         10-10         C-000669         12-12-00         27-00           CAM         21-70-30         10-10         21-70-30         10-10         20-21782         10-30         28-20           CAM         21-70-30         10-10         21-70-30         10-10         20-21782         10-30         28-20           CAM         21-70-30         10-10         21-70-30         10-10         20-21782         10-30         28-20         10-10         20-20         10-30         28-20           CAM         21-70-30         10-10         21-70-30         10-10         21-70-30         10-30         28-20         28-20         28-20         28-20         28-20         28-20         28-20         28-20 <th< td=""><td>c</td><td>740</td><td>13+50.00</td><td>11.10</td><td>17+35-00</td><td>95.46</td><td>54</td><td>CIRCULAR</td><td>395.00</td><td>0.000455</td><td></td><td></td><td>34.10</td><td>22.04</td></th<>	c	740	13+50.00	11.10	17+35-00	95.46	54	CIRCULAR	395.00	0.000455			34.10	22.04
CAM         17+6A±00         GENERA         A4X50         CATENADY         1312.00         C.000594         12:12 .016         27.00           CAM         30556.00         GP.86         37+66.00         GR.96         A2X46         CATENADY         10.00         2.000650         10:12 .016         27.00           CAM         30566.00         GP.86         51+57.34         100.34         42X46         CATENADY         2173.00         C.000650         10:98.016         23.00           CAM         21+70.00         100.36         21+57.34         100.34         A1X46         CATENADY         2173.00         C.000650         10:98.016         23.00           CAM         21+70.00         101.02         42X46         CATENADY         2173.00         C.000650         10:98.016         23.00           CAM         21+70.00         101.02         100.34         A1X46         A1X46         A1X470         100.00         C.000650         10:98.016         23.00           CAM         21+70.00         102.04         102.04         102.04         102.04         102.04         102.04         102.04         102.04         102.04         102.00         102.00         102.00         102.00         102.00         102.00 <td>0</td> <td>CAM</td> <td>17+35.00</td> <td>97.05</td> <td>17+44.00</td> <td>98.10</td> <td></td> <td>TRANSITION</td> <td>03.6</td> <td>0.011111</td> <td></td> <td></td> <td></td> <td></td>	0	CAM	17+35.00	97.05	17+44.00	98.10		TRANSITION	03.6	0.011111				
CAM         30+56.00         GR.8E         30+66.00         GR.9G         TRANSITION         10.00         0.000659         10.9B .016         25.20           CAM         30+66.00         GR.9G         11.AB         42 KAP         CATENABY         2091.34         0.000659         10.9B .016         25.20           CAM         0.000.0C         100.36         21+79.90         101.AB         41 KAB         CATENABY         2091.34         10.9B .016         25.20           CAM         21+79.90         101.AB         41 KAB         CATENABY         10.10         0.0217AP         10.09         10.57 .016         25.20           CAM         21+79.90         101.AB         41 KAB         CATENABY         10.10         0.0217AP         10.09         10.9B .016         24.00           CAM         21+79.90         101.AB         34 KAB         HASKT HANDIE         42.81         0.00049B         7.07 .016         15.30           CAM         34+27.2B         102.49         34 KAB         PASKT HANDIE         32.40         0.00049B         7.07 .016         15.30           CAM         34+50.2B         103.43         34 KAB         PASKT HANDIE         32.40         0.000409         6.71 .016         15.30	0	CAN	17+44.00	98.10	30+56.00	CR.88	44×50	CATENARY	1312.00	0.000594			27.00	17.45
CAM         310466.0         96.96         61.95         110.93         42 X AB         CATENARY         2091.34         0.000659         10.98         0.10         25.20           CAM         21.700.0         100.36         21.790.0         100.36         21.790.0         100.98         10.18         41.846         CATENARY         21.700         0.000669         10.57         0.10         24.00           CAM         21.790.0         101.82         21.790.1         102.04         21.790.1         102.04         21.790.1         10.20         0.000669         10.57         0.10         24.00           CAM         21.790.1         102.04         21.790.1         102.04         34.73.2         102.04         34.73.6         102.04         34.73         102.04         34.73         102.04         34.73         34.73         34.73         42.70         0.000488         7.07         11.50         12.00 <t< td=""><td>0</td><td>CAM</td><td>30+56.00</td><td>98.86</td><td>30+66.00</td><td>96.86</td><td></td><td>TRANSITION</td><td>10.00</td><td>00080000</td><td></td><td></td><td></td><td></td></t<>	0	CAM	30+56.00	98.86	30+66.00	96.86		TRANSITION	10.00	00080000				
CAM         0+000.CC         100.36         21+79.90         101.82         41X46         CATENABY         2177.90         0.020669         10.557.016         24.00           CAM         21+79.90         101.82         21+90.10         102.04         34X36         RELLMIJTH         10.10         0.021782         15.30           CAM         21+90.10         102.04         32+73.28         102.04         32+73.28         102.07         34X36         RASKT HANDLE         55.00         0.000488         7.07.016         15.30           CAM         32+73.28         102.07         34X42         RASKT HANDLE         32.00         0.002187         8.52.016         15.30           CAM         34+50.28         103.04         34X42         RASKT HANDLE         32.00         0.000408         7.07         15.30           CAM         34+50.28         103.04         34X42         RASKT HANDLE         32.00         0.00050         8.52.016         15.30           CAM         34+66.28         103.04         35X14         RASKT HANDLE         1301.40         0.00050         6.15.30         17.00           CAM         54+66.28         104.28         104.28         104.28 104.25         34.35         34.35	0	**	30+66.00	96.96	51+57.34	100.34	42 X 4 R	CATENARY	2091.34	0.000659			25.20	16.29
CAM         21+70-90         101-R2         21+90-10         102-04         34x36         HFLLMDJTH         10-10         0-0217R2         6-71         15-30           CAM         21+90-10         102-04         26+18-26         102-04         26+18-26         102-04         34x36         HASKT HANDLE         565-00         0-00048B         7.07         016         15-30           CAM         32+73-28         102-04         34-27-28         102-07         34-27-28         102-07         34-27-28         102-07         34-27-28         102-07         34-47-28         102-07         34-47-28         102-07         34-47-28         103-04         34-47         4-35-17         4-30-0         0-000105         6-71<-016         15-30           CAM         34-50-28         102-07         34-48-28         103-02         34-44         34-44         4-35-40         4-30-00         0-000105         6-71<-016         15-30           CAM         34-50-28         103-04         103-02         34-44         4-34-44         4-36-40         0-000105         6-71<-016         15-30           CAM         34-50-28         103-04         37-48-28         103-04         34-44-20         34-49-20         0-00060         0-00060	0	*	0 + 00 • 0	100.36		101.82	41 X 46	CATFNARY	2179.00	6-3000669			24.00	15.51
CAM         21+90-10         102.04         25+18.2F         102.49         34x36         PASKT HANDLE         555.0         0.001680         6.71 .016         15.30           CAM         32+73.2F         102.49         34x37.2F         102.40         34x37.2F         102.40         34x37.2F         102.40         34x37.2F         102.00         7.07 .016         12.00           CAM         34x27.2F         102.47         34x59.2F         102.07         34x37         45x57 HANDLE         32.00         0.00105         6.71 .016         15.00           CAM         34x50.2F         103.04         34x42         24x37         CIFCULAR         2x9.00         0.002187         8.52 .016         15.00           CAM         34x50.2F         103.04         34x42         PASKT HANDLE         32x0         0.000605         8.52 .016         15.00           CAM         37x48.2F         103.43         34x42         PASKT HANDLE         345.60         0.000605         8.52 .016         17.00           CAM         37x48.2F         103.25         24x42.2F         103.25         34x42         PASKT HANDLE         1301.40         0.000605         8.52 .016         17.00           CAM         54x66.2F         103.25	0	74.	21+70.90		21+90-10	102.04		RELLMOJTH	10.10	0.021782				
CAM         26+18.2e         102.4g         32+73.2e         102.8l         34×3f         48×3f	0	CAN	21+90-10		26418.26	102.49	34 X 36	PASKT HANDLE	428.18	0.00106.0	6.71 .0		15.30	10.53
CAW         32+73.28         102.81         34+27.28         102.97         34×27.28         102.97         34×27.28         102.97         34×27.28         102.97         34×27.28         102.97         34×27.28         102.97         34×27.28         102.97         34×27.28         102.97         34×27.28         103.04         34×42         PASKT HANDLE         32.00         0.0006105         6.71         10.10         15.00           CAW         34+59.28         103.04         37×48.28         103.02         24·37         CIFCULAR         289.00         0.000602         8.05         0.01         17.00           CAW         37×48.28         103.04         37×48.28         103.04         32×74         6-55         0.000605         8.52         0.01         17.00           CAW         400.94.6P         103.04         37+08.28         104.28         32×74         6-55         0.000605         8.52         0.01         17.00           CAW         40.94.6P         104.28         104.28         32×74         4-5×14         1922.20         0.000605         8.52         0.01         17.00           CAW         0.000.00         92.00         6-55.59         104.28         16-5×2         16-5×2         0.0	0	CAM	26+18.28	102.49		102.81	36	CIPCULAF	655.00	0.000488			12.00	7.76
CAM         34+27.2E         102.97         34+59.2B         103.04         34 x 42         PASKT HANDLE         32.00         0.002187         8.52 .016         32.40           CAM         34+59.2E         103.04         37+48.2B         103.22         24,37         (IPCULAR         289.00         0.000602         8.05 .016         15.00           CAM         37+48.2B         103.43         34 x 42         RA3KT HANDLE         345.60         0.000605         8.52 .016         17.00           CAM         37+48.2B         103.43         34 x 42         RA3KT HANDLE         1301.40         0.000605         8.52 .016         17.00           CAM         54+86.2B         104.2B         32 x 74         RA3KT HANDLE         1301.40         0.000610         6.16 .016         11.10           CAM         54+86.2B         104.2B         26.5 x 2P         AA5KT HANDLE         1301.40         0.000610         6.16 .016         11.10           CAM         54+86.2B         104.2B         102.2S         15         15         11.23 .016         3.54           CHA         0+000.00         90.14         0+42.00         90.76         34 x 36         0.014761         7.92 .016         77.07	0	CAN	32+73.28	102.81	34+27.28	102.97	34 x 36	HASKT HANDLE	154.00	0.000105			16.30	10.53
CAM         34+59,2¢         103.04         37+48.2¢         103.2²         24,3¢         CIPCU_AR         289.00         0.000622         8.05.01b         15.00           CAM         37+48.2¢         103.4²         34x42         RASKT HANDLE         345.6         0.000605         8.52.01b         17.00           CAM         40+94.ep         103.4²         54+86.2¢         104.28         32x34         FASKT HANDLE         1301.40         0.000610         6.16.01b         11.10           CAM         54+86.2¢         104.28         26.5x2P         PASKT HANDLE         1922.2         0.000510         6.16.01b         11.10           SP         CHA         0+00.00         92.00         6+59.5c         102.25         15         CIRCULAF         659.5c         0.015542         1.23.01b         7.92.01b         77.07           CHA         0+00.00         90.14         0+42.c0         90.76         34x36         PASKT HANDLE         42.00         0.014761         7.92.01b         77.07	0	CAM	34+27.28	102.97		103.04	34 X 42	PASKT HANDLE	32.00	0.002187			32.40	20.94
CAM         37+48.2e         103.22         40+94.8e         103.43         34 x 42         PASKT HANDLE         345.f         0.000605         8.52.016         17.00           CAW         40+94.ee         103.43         54+86.2e         104.2e         32 x 34         FASKT HANDLE         1301.40         0.000610         6.16.016         11.10           SP         CAW         54+86.2e         104.2e         105.69         26.5x 2P         PASKT HANDLE         1922.20         0.0005773         4.37.016         7.90           SP         CAW         0+00.00         92.00         6+59.50         102.2e         15         CIRCULAF         659.50         0.015542         1.23.016         3.54           CHA         0+00.00         90.14         0+42.00         90.76         34 x 36         PEGULATO?         23.00         0.014761         7.92.016         77.07	0	CAN	34+59.28	103.04	37+48.28	103.22	24 • 30	CIPCU_AR	289.00	0.000622			15.00	10.34
CAM 40+94.6P 103.43 54+86.2B 104.2B 32X34 PASKT HANDLE 1391.40 0.000610 6.16 .016 11.10  CAM 54+86.2P 104.2R 73+08.4B 105.69 26.5X2P HASKT HANDLE 1922.20 0.003773 4.37 .016 7.90  SP CHA 0+00.00 92.00 6+59.50 102.25 15 CIPCULAF 659.5C 0.015542 1.23 .016 3.54  CHA 0+00.00 90.14 0+42.00 90.76 34X3E PASKT HANDLE 42.00 C.014761 7.92 .016 77.07	0	CAM	37+48.28	103.22	40+94.88	103.43	34 X 42	RASKT HANDLE	345.60	0.000605			17.00	10.99
CAM 54+R6.2P 104.2P 73+0P.4P 105.69 26.5X2P BASKT HANDLE 1922.20 0.0003773 4.37.016 7.90  CHA 0+00.00 92.00 6+59.50 102.25 15 CIRCULAF 659.5C 0.015542 1.23.016 3.54  CHA 0+00.00 90.14 0+42.CO 90.76 34.36 PASKT HANDLE 42.00 C.014761 7.92.016 77.07  CHA 0+42.00 90.7E 0+65.00 90.76 REGULATOR 23.CO	0	CAM	40+04. PP	103.43		104.28	32 X 34	PASKT HANDLE	1391.40	0.000610			01.11	7.17
CHA 0+00.00 92.00 6+59.50 102.25 15 CIRCULAF 659.5C 0.015542 1.23 .016 3.54  CHA 0+00.00 90.14 0+42.C0 90.76 34.36 HASKT HAYDLF 42.C0 0.014761 7.92 .016 77.07  CHA 0+42.00 90.7E 0+65.00 90.7G REGULATO? 23.C0	0	PAS	54+86.28	104.28		105.69	26.5x2P	HASKT HANDLE	1922.60	0.303773		9110	06.7	5.11
CHA 0+00.00 90.14 0+42.00 90.76 34x36 PASKT HAVOLF 42.00 0.014761 7.92 .016 77.07 CHA 0+42.00 90.76 0+65.00 90.76	1186	CHA	00.00+0	92.00		102.25	15	CIRCULAR	98.669	0.015542		9116	99.0	1.23
CHA 0+42.00 90.76 0+65.00 90.76 REGULATOR	11	CHA	00.00.00	90.14	0+42.00	96.76	34×36	PASKT HANDLE	45.00	0.014761			10.11	19.61
	=	CHA	0+45.00	90.76	0+65.00	. 92.06		REGULATO?	23.00					

TABLE A-1 MDC INTERCEPTORS NORTH SYSTEM

SECT	רסכ	FROM STATION	INVER T	STATION	INVERT (FT)	SI ZE (IN)	SHAPE	LENGTH (FT)	S_OPE	AREA (50=T)	Z 7	CAPACITY (C= S)	(MGD)
31	VH.	0+65.00	97.00	3+95.00	94 . 85	29X37	GOTHIC	330.00	0.012393	5.48	910.	42.90	27,73
33	CHA	3+95.00	94.85	31+67.60	96.23	37 X 4 4	GOTHIC	2772.60	0.000497	8.97	910.	15.60	10.73
31	4	31+67.60	96.23	31+67-60	64.96		DROP MANHOLE						
31	CHA	31+67.60	96.43	39+49.30	16.96	31 X39	GOTHIC	673.30	0.000712	15.9	9 10 •	12.90	9.34
32	CHA	38+40.00	96.89	47+00.00	97.48	31 X39	GDT H1C	860.00	0.000698	6.51	• 010	12.80	8.27
32	4	47+00-00	97.4B	63+16.00	98.78	29 X 3 7	G01H1C	1616.00	0.000804	5.48	• 016	10.90	7.04
32	CHA	63+16.00	98.78	63+16.00	98.85		DROP MANHOLE						
32	CHA	63+16.00	98.85	69+21.00	69.33	27 X 36	GOTHIC	905.00	0.000793	5.15	910.	10.01	5.47
32	CHA	69+21.00	66.33	69+21.00	04.66		DROP MANHOLF						
32	СНА	69+21.00	04.66	85+87.00	100.91	25 X 34	GOTHIC	1666.00	90600000	4.49	• 10 •	9.80	5.69
32	CHA	85+87.00	160001	85+87.00	101.01		DROP MANHOLF						
32	CHA	85+87.00	101.01	91+57.00	101.57	22×31	GOTHIC	570.00	0.000982	3.55	9 10 •	6.80	4.39
32	СНА	91 +57.00	101.57	91+57.00	101.67		DROP MANHOLE						
32	Q H D	91+57.00	101.67	101+16.60	102.71	19 X28	GOTHIC	03.656	0.001083	2.74	910.	90.6	3.27
35	CHA MFD	0.00.00	91.20	0450.00	91.51	40x49	GOTHIC	920.00	0.000336	10.84	9 10 •	17.50	11.31
35	CHA MFD	9+20.00	91.51	9+20.00	91.58		DROP MANHOLE						
35	CHA MFD	9+20.00	91.58	33+79.00	92.40	39 X47 .50	GOTHIC	2459.00	0.000333	10.15	910.	15.90	10.28
35	CHA MFD	33+79.00	92.40	33+79.00	92.81		DROP MANHOLE						
35	CHA MFD	33+79.00	92.81	40+86.00	93.04	35 X43 . 50	GOTHIC	707.00	0.000325	9.25	910.	13.90	8.98
35	CHA MFD	*0+86.00	93.04	40+86.00	94.20		DROP MANHOLE						
35	CHA MFD	*0*86.00	94.20	83+70.00	97.21	22 X27 . 50	GOTHIC	4284.00	0.000702	3.08	910.	4.70	3.04
36	82	00.00+0	93.20	00.81+0	100.93	15	CIRCULAR	18.00	0.429444	1.23	• 01 5	34.37	22.21

TABLE A-1 MDC INTERCEPTORS NORTH SYSTEM

	SECT	٦٥٦	FROM	INVERT	STATION	I NVERT (FT)	SIZE	SHADE	LFNGTH (FT)	S. UP E	A2:A M (SOFT)	2 7 1	CFS) (N	(MGD)
F         0.000.0         99.27         4.455.00         69.40.4         0.000.0         CATENDAY         SECTOR         0.000.00         CATENDAY         10.00.00         10.00.00         71.00         7	٠	8.	0+14-00	100.93	2+35.34	102.02	9	CIPCULAP	217.34	0.005015		015	3.71	2.40
FF         4455.0         FRANCE	11	8	00.00+0	12.68	4+55.00	49.68	40.50X45.50	CATENARY	455.00	0.005747		910	71.40	46.18
E         30.4550         30.4550         30.4550         30.4550         30.4550         41.20         30.4550         11.20         30.4550         11.20         30.4550         11.20         30.4550         11.20         30.4550         11.20         30.4550         11.20         30.4550         11.20         30.4550	1	8	4+55.00	49.54	4+75.00	89.90		FELLMOUTH	20.00	0.013000				
E4         20.00 Section         41.20         20.00 Section         41.20         20.00 Section         41.20         20.00 Section         41.20	1	8	4+75.00	89.90	20+85-00	01.20	36.50×41	CATENARY	1610.00	0.000807		9 10	19.55	66.11
Fig         20495.C3         01.20         ARRBILTR         03.50X41         CATENABY         2776.7H         0.0000003         8.12         01.05         01.0         13.55         1           Fig         0.000000         95.22         0.020X45.SG         CATENABY         25.00         0.000000         8.12         01.0         0.0	37	EP	20+65-00	91.20	20+95.00	91.20		PELLMOJTH	10.00					
FH         0000000         85.27         0000000         89.22         00.000450         CATEMADY         45.00         0.000501         10.06.010         29.00           FH         0000050         85.22         00.000055         60.000000         0.00050         10.00         0.000         0.	1	89	20+62-00	01.20	48+81.78	93.45	36.50×41	CATENABY	2786.78	0.000803		910	18.55	11.99
FB         0+45.0C         65.0D         AB.7C         AB.7C         AB.7C         AB.5C	17.5	#	0+00+0	12.24	0+45.00	89.22	40.50 X45 .50	CATENARY	45.00	0.001111		910	29.00	18.74
FF         O+65-00         PR-70         2+76-14         RR+56         40-50 K45+SG         CATEMARY         711-14         0.000757         10-06-0016         23-33         1           FR         O+050-00         92-45         94-18         36-50 K41         CATEMARY         705-00         0-000000         8-12-016         23-93         1           FR         94-25         94-18         36-50 K41         CATEMARY         705-00         0-000000         8-12-016         23-86         1           FR         10-25-00         94-12         36-50 K41         CATEMARY         705-00         0-000000         8-12-016         13-35         1           FR         10-25-00         94-27         10-25-00         94-37         10-25-00         94-37         10-25-00         94-38         11-20-00         10-20-00         <	17.5	8	0+45.00	85.22	00.63.00	88.70		PEGULATOR	20.00	0.026000				
FA         0+00+00         0+24-6         0+03+00         94-18         36-50 x 41         CATEMARY         073-00         0+000 c 25         0+12 + 10         14-55         1           FA         0+03+00         0+12 + 10	17.5	a	00.53.00	01.99	2+76.14	88.54	40.50 X45.50	CATENARY	2111.14	0.000757		910	23.93	15.47
ER         9+02±-0.C         9+1.2         0+1.2 <t< td=""><td>8</td><td>ť</td><td>00.00.0</td><td>93.45</td><td>30.50+0</td><td>94.18</td><td>36.50×41</td><td>CATFNAPY</td><td>963.60</td><td>0.000808</td><td></td><td>910</td><td>18.55</td><td>11.99</td></t<>	8	ť	00.00.0	93.45	30.50+0	94.18	36.50×41	CATFNAPY	963.60	0.000808		910	18.55	11.99
FB         0+35.CO         04.27         10+25.0O         04.27         36.50 K 41         CATENAEY         07.0O         0.000777         8-12 .016         13.55         13.55           FB         10+25.OC         94.27         10+25.OC         04.9A         24         CT-CULAB         57.CC         0.002075         3.14 .016         3.38           FB         10+25.OC         94.9P         12+0C.OC         05.22         1P         CTFCULAB         57.CC         0.002077         1.77 .016         3.74           FB         12+CO.CC         95.22         26+OC.OC         09-12         1P         CTFCULAB         57.CC         0.002071         1.77 .016         3.79           FB         26+OO.CC         95.22         26+OC.OC         09-12         1P         CTFCULAB         57.CC         0.002071         1.77 .016         3.79           FB         21+OO.CC         103.13         1E         CTFCULAB         25.CC         0.002074         1.23 .010         3.13           FB         51+OO.CC         103.13         13.02         13.23         12         CTFCULAB         404.22         0.01964A         1.73 .016         4.16           FB         51+OO.CC         100.00         0.00		8	9+03-00	94.18	9435.00	94.20	64	CI3CU_AP	32.00	0.000625		910	23.48	13.24
FR         10+25.0C         94.27         10+25.00         04.87         CFCP WANHOLE         57.0C         3.002075         3.14 .016         3.38           FR         10+25.0C         94.87         10+77.0C         04.98         12+00.0C         04.98         12+00.0C         04.02071         1.77 .016         3.38           FR         10+77.0C         95.22         26+00.0C         98-12         1P         CTSCULAR         120.0C         0.002071         1.77 .016         3.73           FB         26+00.0C         96-12         1P         CTSCULAR         120.0C         0.002071         1.77 .016         3.89           FB         26+00.0C         96-12         113.02         1P         CTBCULAR         25CC.CC         0.002071         1.77 .016         3.43           FB         51+00.0C         103.13         113.02         12         CTBCULAR         25CC.CC         0.0196Ab         1.73 .016         2.35           FB         51+00.0C         103.13         113.02         12         CTBCULAR         25CC.CC         0.0196Ab         1.73 .016         2.14           FB         04.0C         0.0196Ab         1.79 .010         0.0196Ab         1.79 .010         2.14	œ	8	9+35.00	04.20	10+25.00	94.27	36.50×41	CATENARY	00.00	2.000777		910	13.55	11.99
FA         10+25.00         94.8T         19778.00         94.9A         24         CTBCULAB         573.00         4.002075         3.14 .016         3.38           FA         10+7A-00         94.9A         12+000.00         95.22         1P         CTBCULAB         122.00         0.001967         1.77 .016         3.73           FA         22+00.00         95.22         26+00.00         99.12         1P         CTBCULAB         18-00.00         1.077 .016         3.73           FB         25+00.00         99.12         1P         CTBCULAB         25-00.00         1.023 .010         2.35           FB         51+00.00         103.13         1E         CTBCULAB         25-00.00         1.023 .010         2.35           FB         51+00.00         103.23         13.02         12         CTBCULAB         40.94.32         0.01964h         773 .016         4.06           FB         51+00.00         103.13         13.00         15         CTBCULAB         40.94.32         0.01964h         773 .016         4.06           FB         0+000.00         101.10         102.49         102.40         0.01964h         773 .016         779 .016         779 .016         779 .016         779 .016	•	6	10+25-00	94.27	10+25.00	78.40		CECP MANHOLF						
EA         10+7P+00         94.9P         12+0C+00         95.22         25+0C+00         99.12         1P         CTRCULAR         122-CO         0.002071         1.77 .016         3.79           EA         12+CO+CO         95.22         25+0C+00         9P-12         1P         CTRCULAR         1400-CO         0.002071         1.77 .016         3.89           FA         26+00+0C         9P-12         1P         CTRCULAR         25-CC+CO         0.002071         1.77 .016         3.79           FA         51+00+0C         103-13         1F         CTRCULAR         25-CC+CO         0.002071         1.73 .016         2.35           FB         51+00+0C         103-13         113-02         12         CTRCULAR         404.32         0.019646         .77 .016         4.06           FB         0+00+0C         58-13         17+90+0C         101-10         15         CTRCULAR         404.32         0.01964         .77 .016         4.27           FB         17+90+0C         0+00+0C         0+01+10         26+31+0C         162-89         12         CTRCULAR         271-CO         0+01964         1.77 .016         4.27	•	83	10+25-00	78.46	10+78.00	96.98	24	CIRCULAP	23.52	0.002075		010	3.38	5.42
FB         26+00+00         96+12         1P         CT3CULAR         1400+00         0+002071         1.77 + 016         3.89           FB         26+00+00         9P+12         51+00+00         103+13         1F         CTBCULAR         25-00+00         0+002071         1.77 + 016         2+35           FB         51+00+00         103+13         1F         CTBCULAR         404+32         0+019646         -79 + 016         2+35           FB         51+00+00         103+13         15         CTBCULAR         404+32         0+019646         -79 + 016         4-06           FB         17+90+00         101+10         26+31+00         101+10         15         CTBCULAR         404+32         0+019646         -79 + 016         4-04           FB         17+90+00         101+10         26+31+00         102+39         12         CTBCULAR         0+1+00         0+01664         1+23 + 016         2+14           FB         17+90+00         101+10         26+31+00         102-39         15         CTBCULAR         291+00         0+000+00         -79 + 016         1+23         -79 + 016         1+20           FB         17+90+00         0+000+00         29+34         2+91+00         35-07	•	£	10+78.00	90.46	12+00.00	95.22	a -	CIRCULAR	122.00	0.301967		9 10	3.7.	2.45
FB         26+00+CO         9P+12         51+00+OO         103-13         15         CIPCULAR         25CC+CO         0+00+2004         1+23 +010         2+35           FB         51+00+OO         103-12         51+00+OO         103-12         51+00+OO         103-12         51+00+OO         103-12         113-OO         12         CIFCULAR         404-32         0+019-646         -79 +010         4+06           FB         0+00+OO         5P+12         17+90+OO         101-10         26+31-OO         101-10         26+31-OO         102-49         12         CIFCULAR         0+1+CO         0+019-OO         -79 +OI         2+14           FB         17+9C+OO         101-10         26+31-OO         102-49         12         CIFCULAR         0+1+CO         0+019-OO         -79 +OI         1+23 +OI         2+14           FB         17+9C+OO         101-10         26+31-OO         95-37         18         CIFCULAR         291-CO         0+0025-OH         1777 +OI         4-27		<b>a</b>	12+00-00	95.22	26+00.00	98.12	a.	CTRCULAR	1400.00	0.002071		910	3.89	2.51
FB         \$1+00.00         103.13         £1+00.00         103.23         £5+98.32         113.02         12         CTFC/LAF         409.32         0.019646         .79         .010         4.06           FB         0+00.00         5F:12         17+90.00         101.10         26+31.00         102.89         12         CTFC/LAF         409.32         0.0019646         .79         .010         4.06           FB         17+90.00         101.10         26+31.00         102.89         12         CTFC/LAF         941.00         0.001464         1.23         .010         2-14           FB         17+90.00         101.10         26+31.00         102.89         12         CTFC/LAF         941.00         0.001902         .79         .010         1.20           FB         0+00.00         94.34         2+91.00         95.07         18         CTG/LAF         291.00         0.002550H         1.77         .010         4.27		8	26+00-00	98.12	51+00.00	103.13	15	CIPCULAR	2500.00	0.302004		910	2.35	1.52
FD         \$1+00.00         \$1.23.23         \$5+98.32         \$113.02         \$12         \$CTFCJLAF         \$409.32         \$0.019646         \$7.79.016         \$4.06           FB         \$0+00.00         \$5+98.32         \$17.90.00         \$101.00         \$1.23         \$010         \$4.14           FP         \$17+90.00         \$101.10         \$26+31.00         \$102.49         \$100.00         \$0.000.35.04         \$1.77.016         \$4.27           FR         \$0+00.00         \$4.34         \$2+91.00         \$95.07         \$100.00         \$2.31.00         \$0.000.35.04         \$1.77.016         \$4.27	•	a	51+00-00	103.13	11+00.00	103.23		DEOP MANHOLE						
0+00.0C 5P.12 17+90.0O 101.1O 15 CIRCULAR 1790.9O 0.0CIECCA 1.23.015 2.14 17+9C.0O 101.1O 26+31.0C 102.49 12 CIRCULAR 941.CO C.301902 .79.016 1.20 0+CO.0O 94.34 2+91.0O 95.07 18 CIPCULAR 231.CO 0.0C2508 1.77.016 4.27	38	9.	21+00•00	103.23	55+98.32	113.02	15	CIRCILAR	404.32	0.019646	. 67.	910	• • •	2.62
FP 17+96.00 101.10 26+31.0C 102.89 12 CIFCULAP 941.CO C.301902 .79.016 1.20 FR 0+60.00 94.34 2+91.00 95.07 18 CIBCULAF 291.CO 0.0C250H 1.77.016 4.27	4981	66	0+00+0	58.12	17+90.00	101.10	15	CIRCULAR	1790.00	0.001664	1.23	010	41.5	1.38
FR 0+60.00 94.34 2491.00 95.07 IR (TUCU_AF 291.00 0.00250H 1.77 .016 4.27	986	8	17+90.00	101.10	26+31.00	102.49	12	CIFCULAP	041.00	0.001902	. 62.	910	1.20	
	9	ä	00.00.0	94.34	2+91.00	10.26	41	CTUCULAR	291.00	0.00250R	1.77 .	910	4.27	2.76

TABLE A-1 MDC INTERCEPTORS NORTH SYSTEM

SECT	۲٥۷	FROM	TNVER T	STATION	INVERT (FT)	S12E (1N)	SHAPE	LENGTH (FT)	SL OPE	AREA (SOFT)	Z 7	CAPACITY (C=S)	(MSD)
39	6.3	2+91.00	95.07	7+34.00	96.18	9.	CIRCULAP	443.00	0.002505	1.77	9 10 •	4.27	2.76
39	9	7+34.00	96.18	17+49.00	99.36	18	CI3CU_AP	1015.00	0.003133	1.77	• 01 6	4.78	3.09
39	FB	17+49.00	95.36	26+91.00	104.12	16	CIRCULAR	942.00	0.005053	1.23	910.	3.78	2.44
30	E.	26+91.00	104.12	32+55.00	106.37	15	CIRCULAR	564.00	0.003989	1.23	910.	3.32	2.15
38	5	32+55.00	106.37	49+70-18	113,33	12	CIRCULAR	1715.18	0.004057	. 79	• 010	1.84	1.19
39BR	89	0+00+0	95.36	4+95.00	100.42	15	CIRCU_AP	4 95 • 00	0.302101	1.23	910.	2.41	1.56
3988	£8	4+95.00	100.42	19+75-80	104.17	112	CIRCULAR	1480.80	0.002532	. 79	• 010	1.45	*6.
0	EVE MAL	0.00.00	56.21	62+35.00	98.70	45 X 4 9	BASKT HANDLE	6235.00	0.000399	12.91	• 01 5	25.79	16.67
0	EVE MAL	62+35.00	98.70	62+45.00	15.66		RELLMOJTH	10.00	0.087000				
0	EVE MAL	62+45.00	29.63	62+51.74	15.66	24	CTRCULAR	6.74		3.14	3.14 .015		
=	MAL MEL	0+00+0	66.57	10+20.00	107.97	20 X30	CVAL	1050.00	0.008000	3.26	• 10 •	18.52	11.97
=	MAL WEL	10+50.00	107.97	11+80.00	113.10	20 x 30	OVAL	130.00	0.039461	3.26	• 01 5	41.13	25.58
-	MAL MEL	11+80.00	113.10	23+70.00	125.00	20 X 30	CVAL	11 90.00	0.010000	3.26	• 01 5	20.70	13,38
-	MAL MEL	23+70.00	125.00	24+01.00	131.66	20 X30	OVAL	31.00	0.214838	3.26	• 01 5	66.56	62.04
-	MAL MEL	24+01.00	131.66	44+40.00	133.72	25 x 38	OVAL	2048.00	0.001005	5.14	• 10 •	12.02	7.77
:	MAL MEL	44+49.00	133.72	74+65.00	136.74	22 X33	OVAL	3016.00	0.001001	3.94	• 015	8.40	5.43
:	MAL MEL	74+65.00	136.74	00.00+96	138.87	20 X 30	OVAL	2135.00	166000000	3.26	. 01 5	6.53	4.22
:	MAL MEL	00.00+96	138.87	108+06-63	140.00	20 x 30	OVAL	1206.64	0.000936	3.26	.015	6.33	4.09
2.	MEL	00.00+0	140.45	30+40.95	147.00	12	CIRCULAR	3049.95	0.002147	. 79	• 10 •	1.43	.92
•3	SON CAN	00.00+0	97.75	27+55.00	69.66	35×42	GOTHIC	2755.00	0.0000.0	7.92	9 10 .	15.83	10.88
.3	SOM CAM	27+55.00	69.66	51+55.00	101.42	29 X37	GOTHIC	2400.00	0.000720	5.48	• 10 •	10.36	5.70
	SOM CAM	51+55.00 101.42	101.42	68+20.00	102.62	27 X 3 S	GOTHIC	1665.00	0.000720	. 95	• 10	9.05	5.85

TABLE A-1 MIC INTERCEPTORS NORTH SYSTEM

SOM CAM NFD SOM NFD SOM NFD SOM NFD SOM	68+20.00				*						16.21	
SOM CAM MFD SOM MFD SO		102.62	79+85-60	103.47	23 X 33	G0T H1C	1165.00	0.003729	•• 00	• 01 6	9.86	4.45
HUD SCH HFD SC	79+85.00	103.47	79+45.00	103.81		DRIP MANHOLE						
# # # # # # # # # # # # # # # # # # #	79+85.00	103.81	107+70-00	106.13	18	CIRCULAR	2785.00	0.000833	1.17	.016	2.46	1.59
MFD SON MFD SO	00.00+0	100.35	00.95+0	100.75	15	CIRCULAR	56.00	0.007142	1.23	910.		2.88
MFD SON MFD SON MFD SON MFD SON	0.00.00	101.24	00.87.00	101.98	10	CIRCULAP	97.00	0.004505	. 55	• 01 6	19.1	1.04
MFD SON MFD SON	0+21.71	106.27	4.05.00	108.79	36 x 4 3	S01H1C	783.29	0.000667	8.47	910.	17.73	11.46
WUS 05 05	8+05-00	106.72	4+10.00	95.80	54	NOHOIS	2.00		3.14	.016	17.48	11.30
MFD SON	8+10.00	09.35	00.00+6	95.80	54	SIPHON	00.06		3.14	.016	17.48	111.33
MF0 S0 M	00.0000	95.80	9+10.00	110.32	4 %	NOHAIS	10.00		3.14	.016	17.48	11.30
MFD SON	9+10.00	110.32	22+26.00	111.117	36 X 4 3	GOTHIC	1316.00	0.000645	P. 47	9 10 •	17.79	11.50
71.	23+44.00	97.58	26+00.07	97.79	35×42	ботніс	256.07	0.000663	7.92	.016	15.38	10.59
	0.00.00	114.04	30+79.00	115.88	31 x 15 . 25	GOTHIC	2079.00	0.000000	5.96	.016	7.67	4.96
7 .	30+79.00	115.58	30+79.00	115.71		CROP MANHOLF						
71.	00.67+01	115.71	47+00.00	117.06	27×30 . 3P	ССТИТС	1621.00	0.000832	4.51	9 10 .	7.67	4.96
7.1	47+00.00	117.06	47+00.00	117.13		DPOP MANHOLE						
Z. Z.	47+00.00	117.13	56+07-53	117.88	24 X29.50	GOTHIC	907.53	0.300826	3.89	9 10 .	9.70	5.62
44.5 WFD WIN	00.0000	1111.03	32+97.50	112.49	35×3¢	GOTHIC	3297.50	0.000442	7.36	. 01 6	12.06	7.79
44.5 MFD WIN	32+97.50	112.49	53+11.00	113.38	33 X 37	60T H I C	2013.50	0.000442	6.62	.016	10.45	5.73
44.5 WED WIN	53+11.00	113.38	53+52.00	113.83	20	SIPHON	41.00	0.010976	2.18	910.	7.49	4.84
44.5 MFD WIN	53+52-00	113.83	56+84.00	113.97	33×37	GOTHIC	332.00	0.300421	6.62	910.	10.17	6.57
7 3	00.00+0	117.88	20+39.00	119.58	24 X29 .50	GEVHIC	2039.00	0.030833	3.89	9 10 .	6.93	4.48
45 WIN	20+39.00 119.58	119.58	20+42.00	119.59	2	CINCU.AR	3.00	0.003333	3.14	910.	11.34	7.33

TABLE A-1 MCC INTERCEPTORS NORTH SYSTEM

SECT	707	FROM STATION	(FT)	STATION	(FT)	SIZE (IN)	SHAPE	LENGTH (FT)	S_0PE	(SQ=T)	2 7	CFS) (	(MGD)
5	Z	20+42.00	115.59	25+62.00	119.85	24 X29 .50	GOTHIC	520.00	00.000500	3.89	910.	5.50	3.55
•	<u>z</u>	25+62.00	115.85	25+67.00	119.86	54	CIRCULAR	2.00	0.002000	3.14	910.	9.23	5.32
5	2 3	25+67.00	119.86	43441.00	121.50	24 x29 . 50	GOTHIC	1774.00	0.000924	3.89	910.	7.48	4.83
5	2 3	43441.00	121.50	43+66.00	121.52	24	CIRCULAR	25.00	0.000800	3.14	910.	5.55	3.59
5	2 2	43+66.00	121.52	45+40.00	121.67	24 X29 . 50	GOTHIC	174.00	0.000862	3.89	9 10 •	7.22	4.67
5	Z	45+40.00	121.67	54+36.00	122.42	22 X27 .50	60f HIC	896.00	0.000837	3.26	910.	19.0	3.63
	Z	54+36.00	122.42	54+80.00	122.45	24	CIRCULAR	***	0.000681	3.14	910.	5115	3.31
5	7	54+80.00	122.45	56+55.00	122.73	22 x27 . 50	GOTHIC	175.00	0.025714	3.26	910.	31.10	20.10
5	2 2	26+55.00	122.73	56+55.00	127.23		DROP MANHOLE						
5	21.3	56+55.00	127.23	65+07.00	128.08	22 X27 .50	G0THIC	852.00	0.301009	3.26	• 01 6	6.13	3.96
9	BCM NIM	0+00+0	128.06	23+75.00	130.45	22×28	GOTHIC	2375.00	0.001006	3.33	910.	5.30	4.07
9.	BON NIN	23+75.00	130.45	25+43.00	130.62	18 x24 • 50	GOT H IC	168.00	0.001011	2.38	910.	4.03	2.60
9	WIN WOR	25+43.00	130.62	25+71.00	130.65	20	CIRCULAR	28.00	0.001071	2.18	910.	3.97	2.57
9.	WIN WOR	25+71.00	130.€€	34+56.00	133.39	18 X24 . 50	G0THIC	995.00	9608 00.0	2.38	9 10 .	7.06	4.56
*	WIN WOR	34+55.00	133,39	34+56.00	133.70		DROP MANHOLE						
9	#IN #08	34+56.00	133.70	57+50.00	147.50	15	CIRCULAR	2294.00	0.306015	1.23	910.	*:34	2.80
*1	BUN NIN	0 0 • 00 • 0	122.75	1+35.00	122.89	20	CIRCULAR	135.00	0.001037	2.18	9 10 .	3.66	2.37
.1	BON NIA	1+35.00	122.89	1+87.00	122.94	15	NOHels	52.00	0.300961	2.18	910.	1.22	0.79
*1	SIN WOR	1+87.00	122.94	10+87.00	124.29	20	CIRCULAP	000.006	0.000133	2.18	910.	1.31	.85
*1	BON NIN	10+87.00	124.29	10+87.00	124.41		DROP MANHOLE						
.1	WIN WOR	10+67.00	124.41	30+20.00	132.13	<b>1</b>	CIRCULAR	1933.00	0.003993	1.23	910.	3.32	2.15
*1	808 NIA	30+20.00	132.13	45+08.00	133.98	1.9	CIRCULAR	1488.00	0.001243	1.77	.016	3.01	1.95

TABLE A-1 MOC INTERCEPTORS NORTH SYSTEM

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SECT	٦٥٦	STAT 10N	1 NVFB T (F T)	TO STATION	INVERT (FT)	S12E (1N)	SHAPE	LENGTH (FT)	S_OBE	7 (Y=08)	CAPACITY (C= S) (	(MGD)
4	ARL SOM	00.00.00	98.60	00.00+0	30.00		DROP MANHOLE					
	ARL SOM	0+00+0	00.35	5+55-80	100.39	12	CICCULAR	555.80	0.002500	510. 64.	1.54	1.00
8	APL SOM	0+00•0	00.00	4+54.45	106.20	1.8	CIRCULAR	454.45	0.002640	1.77 .015	4.68	3.02
8	APL SOM	00.00+0	111.52	5+79.5A	120.14	10	CIRCU_AR	579.58	0.014872	· 55 · 01 5	2.29	1.48
* 8 *	NOS	00.00+0	112.60	5+59.40	119.64	16	CIRCULAR	559.40	0.012584	1.23 .015	97.0	• .06
0.4	MFL	3 3*00+0	140.67	00.62.00	140.75	20	CIRCULAR	29.00	0.002758	2.18 .015	6.37	4.12
0 4	MFL	0+24.00	140.75	14.0.61	142.44	24	CIPCU_AR	911.60	0.002082	3.14 .015	3.96	5.79
64	MFL	8 • 40 • 6 1	142.44	35+44.88	146.87	16	CIRCULAR	2704.28	0.001638	1.77 .01 5	3.69	2.38
6	MFL	35+44.68	146.87	1948B.04	107.02	15	CIRCULAR	341.16	0.001612	1.23 .015	\$ . 25	1.45
20	NF.	0.00.00	147.43	2+50.00	147.76	18	CIRCULAR	00.036	0.001320	1.77 .015	3.31	2.14
90	M.	2+50.00	147.76	10+01.50	148.73	18×20	GUTHIC	751.50	0.301290	2.82 .015	3.76	2.43
20	¥E,	10+01-50	148.73	15+79.85	150.47	19 x 20	GETHIC	578.35	0.003008	2.82 .015	5.74	3.71
90	MEL	15+79.85	150.47	15+79.85	151.67		DROP MANHOLF					
20	I E	15+79.45	151.67	23+53-95	155.54	1,	CIRCULAR	774.10	0.304999	1.23 .015	3.96	2.55
20	MEL	23+53-55	155.54	23+53.95	156.88		DROP MANHOLF					
90	MEL	23452,95	156.88	26.69.85	159.13	•	CIRCULAR	295.91	509700.0	1.23 .015	4.89	3.16
20	MEL	26+40.85	159.13	26+49.85	150.47		DROP MANHOLF					
20	ž	26+4G.RE	155.47	33478.48	167.00	61	CIRCULAR	728.63	9.210334	1.23 .015	5.70	3.68
20	¥.	13478.48	167.09	35+85.00	167.82	15	CIRCULAR	206.52	0.003970	1.23 .015	3.53	2.28
90	,	35+65.00	167.82	43+20.00	170.24	12	CIRCULAR	735.00	0 -33 3292	510. 64.	1.77	1:1
20	1	43+20.00	176.24	46.64.55	171.02	12	CIACULAR	344.55	0.002263	\$10. 67.	1.47	. 95
15	* F.	0.00.00	150.47	2+05-00	153.94	12	CIFCULAR	205.00	0.336871	. 79 . 01 5	2.56	1.65

TABLE A-1 MCC INTERCEPTORS NORTH SYSTEM

SECT	רסכ	FROM STATION	INVERT (FT)	STATICN	INVERT (FT)	SIZE	SHAPE	LENGTH (FT)	3c07S	SOTT) NANN	CAPACITY (C=5)	(MGD)
15	1	5+05-00	153.94	9+66.93	157.19	15	CIRCULAR	461.93	0.007035	310. 67.	2.59	1.67
15	HEL	9+66.93	157.19	12+88.95	164.06	12	CIRCULAR	322.02	0.021134	. 79 .015	16.91	2.91
15	MEL	12+88.95	164.06	14+12.02	166.40	12	CIRCULAR	123.07	0.019013	\$10. 67.	26	2.75
5	HEL	14+12.02	166.40	21+19-81	173.97	12	CIRCULAR	705.79	0.014907	. 79 .015	3.77	2.44
15	Į.	21+19.81	173.97	25+46.21	185.05	12	CIRCULAR	426.40	0.025984	. 79 .015	85.	3.22
21	MEL	25+46-21	185.05	27+54.69	188.84	12	CIRCULAR	208.48	0.018179	. 79 .015		5.69
15	MEL	27+54.69	186.84	27+54.69	192.03		DROP MANHOLE					
15	ME L	27+54.69	192.03	28+60.95	194.96	12	CIRCULAR	106.26	0.027573	510. 64.	5.13	3.32
15	MFL	28+60,95	194.96	30+73-65	198.30	12	CIRCULAR	212.70	0.015702	510. 64.	3.87	2.50
15	MEL	30+73.65	156.30	30+73.65	203.20		DPOP MANHOLE					
15	MEL	30+73.65	203.20	31+47.80	206.09	12	CIACULAR	74.15	0.038975	\$ 10. 64.	01.0	3.94
51	MEL	31+47.80	206.09	34+54.86	217.84	10	CIRCULAR	307.06	0.038266	. 55 . 01 5	3.68	2.38
15	MEL	34+54.86	217.84	34+54.86	224.07		DROP MANHOLE					
15	WEL	34+54.86	224.07	36+20.59	235.99	10	CIRCULAR	165.73	0.071924	. 55 . 01 5	5.00	3.26
51	MEL	36+20.59	235.99	37+47.59	242.92	31	CIRCULAR	127.00	0.054566	.55 .015	4.39	2.84
15	MEL	37+47.55	242.92	38+72.79	245.44	10	CIRCULAR	125.20	0.020127	. 55 . 01 5	5.66	1.72
15	MEL	38+72,79	245.44	41+23.59	247.47	10	CIRCULAR	250.80	0.008094	.55 .015	1.69	1.09
25	APL	0+00+0	106.20	11 +44 . 10	102.14	41	CIRCU_AR	1144.10	0.001695	1.77 .015	3.75	2.42
25	ARL	11144.10	102.14	16+52-10	103.33	61	CIRCULAR	508.00	0.002342	1.77 .015	•	2.85
25	ARL	16+52-10	103.33	52+75.40	110.75	18	CIRCULAR	3623,30	0.302047	1.77 .015	4.12	2.66
25	ARL	52+75.40	116.75	52+75.40	110.90		DROP MANHOLE					
25	ARL	52+75.40	110.90	58+80-50	1115-111	15	CIRCULAR	605.10	0.001999	1.23 .015	2.50	1.62

TABLE A-1 MPC INTERCEPTORS NURTH SYSTEM

F 24	רטכ	FROM	INVED T	STATION	INVERT (F T)	S12F (1N)	E WHO	(FT)	S_0PE	A35A (S0=T)	77	CAPACITY (C=S) (	(MCD)
2	<b>A</b> BL	58+80.50	112.11	54480.50	115.70		DRIP MANHOLE						
25	AP.	58+40.50	115.70	60+88.00	121.00	15	CIRCULAR	207.50	0.025975	. 79	9 10.	4.98	3.22
25	ARL.	40.88.00	121.09	64+51.90	137.18	15	CIFCULAR	363.90	0.016735	.79	910.	4.00	5.59
25	JA4	64451.90	137.18	73+57.07	152.57	12	CINCULAR	905.17	0.017622	. 79	• 01 5	4.03	2.60
25	APL.	73+57.07	152.57	84496.51	168.64	18	CISCULAR	1339.44	0.012012	.79	. 01 5	3.38	2.18
25	ARL	86+ 96 - 51	168.64	105+81.28	183.34	12	CIRCULAR	1884.79	0.007799	. 79	.015	2.73	1.76
25	ARL	105+81.28	183.34	118+10.71	194.81	12	CIRCULAR	1229.43	0.009329	. 79	9 10 .	2.98	1.93
25	ARL	118+10.71	194.81	132+49.11	211.35	21	CIRCULAR	1438.40	0.011498	. 79	• 10 •	3.31	2.14
25	<b>₽</b> BL	132+40.11	2111.35	138.92.02	225.25	12	CIRCULAR	642.91	0.021620	.79	9 10 •	4.54	2.93
53	9	00.00.00	225.25	5+51.20	228.90	81	CINCULAR	651.20	0.305605	1.17	• 01 5	6.82	•
53	<b>A</b> PL	6+51.20	228.90	6+51.20	231.09		CPOP MANYOLE						
53	AR.	6+51.20	231.09	8+33.20	232.92	91	CIPCULAR	182.00	0.010054	1.23	• 10 •	5.61	3.63
53	AP.	8+33-20	232.92	9+ 98 90	234.53	15	CIRCULAR	165.70	0.009716	1.23	• 10 •	5.51	3.56
53	APL	04586	234.53	16+48.10	241.01	15	CIRCULAP	549.20	0.008441	1.23	• 01 5	5.14	3.32
53	784	16+46.10	241.01	19+59.40	246.54	15	CIRCU_AR	211.30	0.026171	1.23	\$ 10.	0.6	5.84
53	APL	18+59.40	246.54	19+98-75	247.29	15	CIRCULAR	139.35	0.006099	1.23	\$ 10.	4.37	2.82
53	APL	19+64-75	247.29	24+35.20	540.45	15	CIRCULAR	436.45	0.004949	1.23	• 10 •	3.93	2.54
53	APL	24+35-20	249.45	24+35.20	155.51		PROP MANHOLE						
53	AR.	24+35-20	252.51	32+23.50	256.84	15	CIRCULAR	748.30	0.005492	1.23	• 10 •	• • • • • • • • • • • • • • • • • • • •	2.68
53	184	32+23.50	256.84	33+78.30	19.652	16	CIRCULAR	154.80	0.017894	1.23	.015	7.48	4.83
53	784	33+78.30	255.61	45+10.5A	264.73	15	CIPCULAR	1132.28	6.004521	1.23	\$ 10.	3.76	2.43
9.5	MAL	0 0 0 0 0 0 0	90.66	31+75-17	100.65	36	CIACULAP	3175.17	0.000501	7.07	• 016	12.10	7.82

TABLE A-1 MCC INTERCEPTORS NORTH SYSTEM

MAL         31175.17         100.066         31475.17         100.060         A+1433.00         101.54         30         CIRCULAD         957.81         0.000666         4.91.016         3.63           MAL         41133.00         101.54         30         CIRCULAD         957.81         0.000666         4.91.016         3.63           MAL         41133.00         101.54         41433.00         105.45         30         CIRCULAD         156.00         0.00066         4.91.016         3.63           MAL         41133.00         101.54         107.01         105.45         110.60         110.60         15.60         1.77.016         3.63           CHL         0+00.00         107.64         15.40         110.60         33         CIRCULAP         240.00         0.00060         1.77.016         3.34           CHL         0+00.00         102.00         101.67         2.00060         103.00         1.24.00         1.25.00         1.25.00         1.25.00         1.25.00         1.25.00         1.25.00         1.25.00         1.25.00         1.25.00         1.25.00         1.25.00         1.25.00         1.25.00         1.25.00         1.25.00         1.25.00         1.25.00         1.25.00         1.25.00	SECT	707	FROM	INVERT (FT)	STATION	INVERT (FT)	SIZE (IN)	SHAPE	LENGTH (FT)	SLOPE	ARE A ( 50= T)	Z 7	CAPACITY (C=S) (	( MGD )
MAL   MAL   MAL   MEL   MEL   MAL   MEL	•	4	31+75-17		31+75-17	100.90		DROP MANHOLE						
Mail   1133.00   105.45   2211.00   105.45   105.45   106.40   106.00   106.00   106.00   106.00   107.01   107.01   108.00   108.00   108.00   107.01   108.00   108.00   107.01   108.00   108.00   107.01   108.00   108.00   107.00   108.00   108.00   107.00   108.00   1	2.	1	31+75.17	100.90	41+33.00	101.54	30	CIRCULAR	957.83	0.000668	16.4		8.63	5.58
Hailand   Hailand   Horiton   Hori		144	41+33.00		41+33.00	105.45		DROP MANHOLE						
CHA         0+00+0C         107+06         110+06         110+06         15         CHACLAR         1548-00         110+06		14	41+33.00	105.45	52+19.00	10.701	18	CIRCULAR	1086.00	0.001436	1.17		3.24	2.09
CH         0+000-00         10-055         2++++++++++++++++++++++++++++++++++++		MAL	0+00+0		15+48.00	110.60	15	CIRCULAR	1548.00	9.002034	1.23	910.	2.37	1.53
CH         3 cheolog         10 cheolog         10 cheolog         10 cheolog         5.94 cole         12 cheolog	•	£	0.00.00		26+40.00	101.87	~	CIRCULAR	2640.00	0.000500	9.62		18.81	11.83
CH         16+30+00         102+08         16+30+00         103+44         27+70+00         103+44         27+70+00         103+47         35         CIRCULAR         640-00         0.000 R3         5.94         101         9-63           CHL         22+70+00         103-44         22+70+00         103-47         22+70+00         103-47         22+70+00         103-47         22+70+00         103-47         22+70+00         103-47         22+70+00         103-47         22+70+00         103-47         22+70+00         103-47         22+70+00         103-41         22×28         CATENARY         2021-94         0.000997         3-21         101         3-94           CHL         34+64+06         105-10         104-22         22×28         CATENARY         2021-94         0.000997         3-21         101         3-94           CHL         34+64+06         105-10         107-116         125-41         22×28         CATENARY         2021-94         0.000997         1,23         1,78         1,78         1,78         1,78         1,78         1,78         1,78         1,78         1,78         1,78         1,78         1,78         1,78         1,78         1,78         1,78         1,78         1,78         1	•	CF.	26+40.00	101.87	28+87.11	102.08	33	CIRCULAR	247-11	0.000849	5.94		12.54	9.10
CHL         16+35C+00         103-44         22×70+00         103-47         30         CIRCULAR         640+00         0+000R2R         4+91+016         9+63           CHL         22×70+00         103-97         22×70+00         104-22         PPDP MANHOLE         1134+06         0+000R3         3+21+016         9+63           CHL         22×70+00         104-22         3+00+06         105-34         22×70+00         103-97         3+21+016         17-86         17-80 <td></td> <td>ŧ</td> <td>00.00.00</td> <td></td> <td>16+30.00</td> <td>103.44</td> <td>33</td> <td>CIRCULAR</td> <td>1630.00</td> <td>0.000834</td> <td>5.94</td> <td></td> <td>12.42</td> <td>8.03</td>		ŧ	00.00.00		16+30.00	103.44	33	CIRCULAR	1630.00	0.000834	5.94		12.42	8.03
CH         222770.00         103.97         22270.00         104.22         DEDP MANHOLE           CH         222770.00         104.22         34.04.06         105.34         22228         CATENARY         1134.06         0.000987         3.21 .016         17.86         17.86           CH         34.64.06         105.34         22228         CATENARY         2021.94         0.000997         3.21 .016         17.86         17.86           CH         34.64.06         105.10         104.31.05         107.16         15         CIRCULAR         2021.94         0.000936         3.21 .016         17.86 <t< td=""><td></td><td>ŧ</td><td>16+30.00</td><td>103.44</td><td>22+70.00</td><td>103.97</td><td>36</td><td>CIRCULAR</td><td>640.00</td><td>0.000828</td><td>16.4</td><td>.016</td><td>69.63</td><td>6.22</td></t<>		ŧ	16+30.00	103.44	22+70.00	103.97	36	CIRCULAR	640.00	0.000828	16.4	.016	69.63	6.22
CH         22+70.00         104.22         34+04.06         105.34         22x28         CAFENARY         1134.06         0.000967         3.21 .016         3.94           CH         34+C4.06         105.32         105.34         22x28         CAFENARY         1134.06         0.000967         3.21 .016         17.86		G.F.	22+70.00		22+70.00	104.22		DROP MANHOLE						
CH         34+C4.06         105:34         54+26.00         123.41         22×2P         CATENARY         2021.94         0.006936         3.21 .016         17.86	1	¥ 5	22+70.00		34+04.06	105.34	22×28	CATENARY	1134.06	0.000987	3.21	• 10 •	46.0	3.84
PEV CHL         O+000-00         105-10         10+31.05         107:16         15         CTRCULAR         1031.05         0+001997         1.23 .016         2.35           MAL         MEL         0+000-00         125-00         26+88.00         136-57         48         CTRCULAR         2688.00         0+004304         12-57 .015         81-85		£	34+64.06		54+26.00	123.41	22×28	CATENARY	2021.94	0.008936	3.21	9 10 •	17.86	11.54
MAL         MEL         26488.00         136.57         48         CIRCULAR         2688.00         0.004304         12.57         015         81.85           MAL         MEL         26488.00         136.57         46403.00         137.33         54X56         EXT. CIRCLE         1915.00         0.000396         17.40         015         38.58           MAL         MEL         46403.00         137.53         46428.00         137.54         54X56         EXT. CIRCLE         755.50         0.000400         17.40         015         38.58           MAL         MEL         46403.00         137.55         53493.56         137.56         EXT. CIRCLE         755.50         0.000400         17.40         015         33.58           MEL         0.000.00         137.55         31497.00         139.13         54X56         EXT. CIRCLE         755.50         0.000400         17.40         015         33.58           MEL         31457.00         135.13         32412.00         141.35         475.00         0.148000         17.40         015         13.79           MEL         32412.00         146.13         36         146.13         36         CIRCULAR         2776.00         0.0005         17.0	14	REV CHL	00.00.0		10+31.05	107.16	15	CTACULAR	1031.05	0.001997	1.23		2.35	1.52
MAL         MEL         26+786.00         137.53         54X5R         EXT. CIRCLE         1915.00         0.000396         17.40 .015         38.58           MAL         MEL         46+28.00         137.54         42         CIRCULAR         25.00         0.008400         9.62 .015         38.58           MAL         MEL         46+28.00         137.54         53+93.56         137.85         54X5R         EXT. CIRCLE         765.53         0.000400         17.40 .015         33.58           MEL         0+000.00         137.85         31+97.00         139.13         54X5R         EXT. CIRCLE         765.63         0.000400         17.40 .015         33.58           MEL         31+57.00         141.35         49+78.05         141.35         REDUCE?         15.00         0.148000         17.40 .015         38.58           MEL         32+12.00         141.35         49+78.05         143.21         36         CIRCULAR         1766.05         0.001053         7.07 .015         19.70           MEL         32+12.00         143.21         27+76.00         146.05         0.001051         7.07 .015         19.70           MEL         0+000.00         143.21         27+76.00         146.01         146.0		MAL MEL			26+88.	136.57	84	CIRCULAR	2688.00	0.004304	12.57		81 - 85	52.90
MAL         MEL         46+28.00         137.54         A2         CIRCULAR         25.00         0.008400         9.62.015         80.08           MAL         MEL         46+28.00         137.54         53+93.56         137.85         54 X5R         EXT. CIRCLE         765.55         0.000404         17.40         0.015         33.58           MEL         31+57.00         137.85         31+97.00         141.35         54 X5R         EXT. CIRCLE         765.65         0.000400         17.40         0.015         33.58           MEL         31+57.00         135.13         32+12.00         141.35         49+78.05         141.35         36         CIRCULAR         1766.05         0.01053         7.07.015         13.79           MEL         0+000.00         143.21         27+76.00         146.13         36         CIRCULAR         2776.00         0.001051         7.07.015         13.79           MEL         0+000.00         146.13         36         CIRCULAR         2776.00         0.001051         7.07.015         13.70					46+03.00	137.33	54 X 58	EXT. CIRCLE	1915.00	0.000356	17.40		38.58	24.93
MAL         HFL         46+28.00         137.54         53+93.56         137.85         54 X58         EXT. CIRCLE         765.53         0.000404         17.40 .015         33.58           MEL         0+00.00         137.85         31+97.00         139.13         54 X58         EXT. CIRCLE         3197.00         0.000400         17.40 .015         38.58           MEL         31+57.00         135.13         32+12.00         141.35         4978.05         143.21         36         CIRCULAR         1766.05         0.001053         7.07 .015         19.79           MEL         0+000.00         143.21         2776.00         146.13         36         CIRCULAR         2776.00         0.001051         7.07 .015         19.70           MEL         27776.00         146.13         36         CIRCULAR         2776.00         0.001051         7.07 .015         19.70		WAL MEL			46+28.	137.54	42	CIRCULAR	25.00	0.008400	9.62		80.08	51.75
MEL         0+00.00         137.85         31+97.00         139.13         54 X5R         EXT. CIRCLE         3197.00         0.000400         17.40 .015         38.58           MFL         31+57.00         135.13         32+12.00         141.35         49+78.05         143.21         36         CIRCULAR         1766.05         0.001053         7.07 .015         19.79           MFL         0+00.00         143.21         27+76.00         146.13         36         CIRCULAR         2776.00         0.001051         7.07 .015         19.70           MEL         27+76.00         146.13         36         CIRCULAR         2776.00         0.001051         7.07 .015         19.70		MAL MFL			53+93+56	137.85	54 X58	EXT. CIRCLE	765.55	0.000404	17.40		33.58	24.93
MFL         31+57.00         135.13         32+12.00         141.35         REDUCE?         15.00         0.148000           MEL         32+12.00         141.35         49+78.05         143.21         36         CIRCULAR         1766.05         0.201053         7.07.015         19.79           MEL         0+00.00         143.21         27+76.00         146.13         3f         CIRCULAR         2776.00         0.001051         7.07.015         19.70           MEL         27+76.00         146.12         27+76.00         148.09         DROP MANHOLE	0	MEL	03.00+0		31+97.	139.13	54 X5R	EXT. CIRCLE	3197.00	0.000000	17.40		38.58	24.93
MEL 32+12.00 141.35 49+78.05 143.21 36 CIRCULAR 1766.05 0.301053 7.07 .015 19.79  MEL 0+00.00 143.21 27+76.00 146.13 36 CIRCULAR 2776.00 0.001051 7.07 .015 19.70  MEL 27+76.00 146.12 27+76.00 148.09 DROP MANHOLE	65	#EL	31+57.00		32+12.	141.35		REDUCES	15.00	0.148000				
MEL 0+00.CO 143.21 27+76.00 146.13 36 CIRCULAR 2776.CO 0.001051 7.07 .015 19.70 MEL 27+76.0C 146.12 27+76.00 148.09 DROP MANHOLE	65	MEL	32+12.00		49+78.05	143.21	36	CIRCULAR	1766.05	0.301053	7.07		18.79	12.14
MEL 27+76.00 146.12 27+76.00 148.09	09	N. P.	00.00+0		27+76.00	146.13	36	CIRCULAR	2776.00	0.001051	7.07	. 01 5	18.70	12.09
	0	MEL	27+76.00		27+76.	148.09		DROP MANHOLE						

TABLE A-1 MCC INTERCEPTORS NORTH SYSTEM

707	STATION	(FT)	STATION	INVERT (FT)	SIZE	SHAPE	CFT)	S.0.9E	( SOF T)	Z 7 7 4 2	CAPACITY (C=S) (	( MGD )
1 1 1	27+76.00	148.00	35+35.90	154.14	90	CIRCULAR	759,90	0.007961	4.91	\$ 10.	31.78	23.54
Ne l	35+35.90	154.14	37+51.30	161.21	30	CIRCULAR	215.40	0.032822	4.91	5 10.	64.53	41.70
. 3	37+51.30	161.21	56+95.01	170.91	30	CIRCULAR	1943.71	0.004090	4.91	\$ 10.	25.16	15.26
J. J.	00.00.00	91.10	31+37.00	92.48	5.4	CIRCULAP	3137.00	0.000439	15.90	.016	33.55	21.68
JE S	31+37.00	92.4 8	41+36.59	93.00	4	CIRCULAP	65.666	0.000520	12.57	.016	20.07	17.24
CAL	0+00-00	93.00	27+98-18	04.12	4	CIRCULAR	2788.18	0.000401	12.57	.016	23.39	15.12
WIL CR	9 0+03-17	94.12	2+41.00	94.23	2-36	SIPHON	237. 83	0.000462	14.14	.016	19.60	12.02
WIL CR	20-14-5	94.23	3+00.00	94.28	4	CIRCULAP	140.00	0.000335	12.57	910.	21.40	13.83
**	00.00.0	110.00	47+83.90	114.78	24 X 2 P	EXT. CIRCLE	4783.93	0.000099	3.81	.016	7.50	4.85
3	47+83.90	114.78	£0+50.00	119.58	22 X 2 A	FXT. CIPCLE	236.10	0.020330	3.21	910.	26.90	17.42
740	50+20.00	119.58	51+85.00	119.75	22 X 2 P	EXT. CIPCLE	165.00	0.001030	3.21	910.	90.9	3.92
M4.0	51+85.00	119.75	57+30.00	120.29	26	CIRCULAR	545.00	06600000	3.41	910.	0.43	4.16
7 7	57+36.00	120.29	58+09.00	120.37	22 X 2A	CATENATY	79.00	0.001012	3.21	.016	10.0	3.88
**	58+09-00	120.37	63+58.45	123.15	22 X 2 B	CATENARY	549.45	0.005059	3.21	910.	13.45	8.69
1	0.00.00	98.42	13+10.00	100.001	45	CIRCULAP	1310.00	0.001206	15.90	5 10.	59.31	39.33
HAL	13+10.00	100.00	13+75.00	100.40	4-42	CIACULAR	65.00	0.006153	38.48	.015	274.10	177.1
74.	13+75.00	100.40	13+75.00	101.40		CRIP WANHOLE						
* * L	13+75.00	101.40	15+46.00	102.35	45	CIRCULAR	171.00	0.005555	3.62	. 01 5	95.10	42.07
WAL	15+46.00	102.35	17+38.00	106.15	28 X 4 2	טאשר	192.00	107610.0	6,33	5 10.	73.40	45.50
1	17+39.00	196.15	18443.00	109.81	2P X 42	CVAL	105.00	0.334R57	6.33	.015	93.44	60.39
1	18443.00	105.81	20+15.00	117.41	28 X 42	DVAL	172.00	0.3441 P6	6.33	•015	105.20	64.49
1	20+15.00	117.41	20+66.70	120.00	28 x 4 2	CVAL	51.70	0.050006	6.33	.015	112.00	72.38

TABLE A-1 MDC INTERCEPTORS NORTH SYSTEM

2	٦٥٦	STATION	INVERT (FT)	STATION	INVERT (FT)	SIZE	SHAPE	(FT)	S_00E	(SOF T)	2 7 2 4	CAPACITY (CFS) (	( 460)
:	<b>1</b>	20+66.70	120.00	23+73.00	130.80	28 X 42	OVAL	306.30	0.035259	6.33	• 01 5	93.97	60.73
•	MAL	23+73.00	130.80	29+46.00	133.82	•5	CIRCULAR	576.00	0.005243	9.62	• 10 •	63.27	40.89
:	MAL	29+46.00	133.82	29+54.30	133.82		REDUCER	8.30					
9	MAL	41+31.39	101.54	71+97.03	103.58	30	CIRCULAR	3065.64	0.000665	16.4	• 10.	9.18	5.93
	MAL	71+97.03	103.58	71+97.03	103.83		DROP MANHOLE						
10	HAL	71+97.03	103.83	86+30-16	105.25	24	CIRCULAR	1433.13	0.000000	3.14	\$ 10.	91.0	3.99
•	MAL	0+00+0	105.21	25+17.00	107.05	18	CIRCULAR	2517.00	0.000731	1.77	.015	2.47	1.60
9	MAL	25+17.00	107.05	25+17.00	119.58		DROP MANHOLE						
9	TY.	25+17.00	119.58	26+29.42	124.06	12	CIRCULAR	112.42	0.039850	.79	510. 64.	6.17	3.99
	MFD WIN	0.00.00	110.85	0+35.00	110.86	*5	CIRCULAR	35.00	0.300285	9.62	9.62 .015	14.75	9.53
	MFD WIN	0+35.00	110.86	48+00.00	112.77	*	CIRCULAR	4765.00	0.000.00	15.90	• 10 •	34.16	22.08
	2	0.00.00	112.77	00.10+9	113.01	2.5	CIRCULAR	601.00	0.000399	15.90	510. 06.51	30.16	55.08
•	NI B	6+01.00	113.01	46+25.00	115.03	••	CIRCULAR	4021.00	0.000502	12.57	• 10 •	27.89	18.02
9	2	46+25.00	115.03	46+32.05	115.03		REDUCER	7.05					
5.	Z I N	0+00+0	115.03	23+02-00	117.18	• 5	CIRCULAR	2302.00	0.000933	9.62	9.62 .015	20.04	17.22
9	2	23+02.00	117.18	47+85.00	118.73	36	CIRCULAR	2483.00	0.000624	7.07	7.07 .015	11.53	9.39
2	2	47+85.00	116.73	48+50.00	118.94	2-20	CIRCULAR	45.00	0.003230	4.36	• 01 5	12.80	9.27
65	21.3	*8*50.00	118.94	49+56.00	119.00	36	CIRCULAR	106.00	0.000566	7.07	.015	13.78	16.8
9	21.3	*****	115.00	49.66.76	120.22		REDUCER	10.76	0.113382				
2	7.	0+00+0	120.22	10+30.00	122.79	24 X 36	CVAL	1030.00	0.002495	4.72	9 10 .	15.82	10.22
2	7.	10+30.00	122.79	14+00-00	136.00	24 x 36	OVAL	370.00	0.035702	4.72	9 10 .	59.78	39.63
2	713	14+00-00	136,00	19+00-00	161.00	24 X 36	OVAL	200.00	0.030000	72	910.	24.80	35.42

TABLE A-1 MCC INTERCEPTORS NORTH SYSTEM

00         164.70         24X36         CVAL         4:5.CC         0.0041371         4.72.010         29.53         11.28           00         122.25         30         CIPCULAP         322.10         0.001271         4.72.010         11.28           00         127.25         30         CIPCULAP         323.10         0.0017647         4.91.015         47.31         31.26           00         137.45         30         CIPCULAP         375.00         0.000689         5.12.015         11.26           00         132.75         30         CIPCULAP         375.00         0.000689         5.12.015         11.26           00         132.70         20         CIPCULAP         128.00         0.000689         5.12.015         10.49           00         133.40         16         CIPCULAP         128.00         0.0005781         2.18.015         9.20           00         133.40         16         CIPCULAP         128.00         0.0005781         1.77.015         9.20           00         133.40         16         CIPCULAP         1146.00         0.005805         1.77.015         0.23           01         152.00         16         CIPCULAP         720.00	SECT	רפנ	FROM	(FT)	STATICN	INVERT (FT)	S12E (1N)	SHAPE	LENGTH (FT)	SLUVE	AREA (SQ=T)	7 7	CAPACITY (CFS) (	( MGD )
		<u>z</u>	19*00.00	161.00	23+55.00	164.70	24 X36	OVAL	455.00	0.008131	4.72	910.	28.53	18.44
	0	7	23+85.00	164.70	35+34.87	166.20	24 X 36	CVAL	1173.67	0.001271	4.72	910.	11.28	7.29
11   11   11   11   11   11   11   1	-	7.	0.00.0	118.90	30+21.00	122.25	30	CIRCULAR	3021.00	801100.0	4.91	. 01 5	11.87	7.67
MIN WINE   0.000.00   127.05   24.04.00   130.75   130.71   10 VAL   126.00   130.75   130.71   10 VAL   130.00   130.75   130.71   10 VAL   130.00   130.75   130.71   10 VAL   130.00   130.75   130.70   130.75   130.70   130.	-	2	30+21.00	122.25	33+44.00	127.95	30	CIRCULAR	323.00	0.017647	16.4	\$10.	47.31	30.58
WIN WINE   Concess   254-6.0   130-75   131-96   20   CINCLLAR   182-0   0.000649   5.12   0.10   10-49   10	-	7 3	33+44.00	127.95	40+41.45	128.55	30	CIRCULAR	697.45	0.001003	16.4	.015	11.26	7.28
WIN WIN   25442.00   131.96   20 CIRCULAR   182.00   0.0005781   2.18 .015   9.90	2	FIN WIP		126.65	23+60.00	130.75	30 × 31	DVAL	2360.00	0.000889	5.12	.015	10.49	5.78
WIN WITH WITH WITH WITH WITH WITH WITH WITH	~	WIN WOR		130.75	25+42.00	131.96	20	CIRCULAR	182.00	0.000648	2.18	910.	06.6	6.40
WIN WITH SHAME         CHECULAR         ADELIA         CHECULAR         ADELIA         CHECULAR         ADELIA         CHECULAR	2	WIN WOR		131.96	26+70.00	132.70	50	CIPCULAR	128.00	0.005781	2.18	.015	9.23	2.97
WICH SHM         CHOOLE         135.40         CHOOLE         133.40         DROP MANHOLE         201.00         0.012139         1.77.015         10.00           WICH SHM         CHOOLE         132.40         137.44         146.20         137.44         177.015         10.00           WICH SHM         2.401.60         137.44         11464.00         149.20         149.20         160.00         177.015         1.77.015         10.00           WICH SHM         2.401.60         137.44         11464.00         149.00         16         1600         177.015         1.77.015         10.00           WICH SHM         2.401.60         1.45.00         1.45.00         1.45.00         1.600         1.77.015         1.77.015         1.000           WICH SHM         2.410.00         1.57.50         1.600         1.57.50         1.600         1.77.015         1.77.015         1.79.00           WICH SHM         2.410.00         1.57.50         1.600         1.57.50         1.600         1.77.015         1.77.015         1.77.015         1.77.015         1.77.015         1.77.015         1.77.015         1.77.015         1.77.015         1.77.015         1.77.015         1.77.015         1.77.015         1.77.015         1.77.015 <td>2</td> <td>WIN WOR</td> <td></td> <td>132.70</td> <td>34+76.34</td> <td>135.00</td> <td>20</td> <td>CIRCULAR</td> <td>406.34</td> <td>0.000372</td> <td>2.18</td> <td>910.</td> <td>2.34</td> <td>1.51</td>	2	WIN WOR		132.70	34+76.34	135.00	20	CIRCULAR	406.34	0.000372	2.18	910.	2.34	1.51
WORD SHAM         0+00+00         133.40         2+01+00         137.44         14 <t< td=""><td></td><td>MUS SHM</td><td></td><td>135.00</td><td>00.00.0</td><td>133.40</td><td></td><td>DROP MANHOLE</td><td></td><td></td><td></td><td></td><td></td><td></td></t<>		MUS SHM		135.00	00.00.0	133.40		DROP MANHOLE						
WORD SHM         2401.CC         137.44         11+64.00         142.26         18         CIRCULAR         963.00         0.005605         1.77.015         0.044           WORD SHM         11+64.00         124.26         21+10.00         149.00         169.00         16         0.005881         1.77.015         0.099           WORD SHM         2110.00         152.00         23+10.00         157.50         16         CIRCULAR         720.00         0.005881         1.77.015         0.99           WORD SHM         23+10.00         152.00         23+10.00         157.50         16         CIRCULAR         720.00         0.005866         1.77.015         0.99           SHM         30+30.00         157.50         166.35         16.61.35         15         CIRCULAR         570.00         0.015526         1.23.015         0.99           SHM         30+30.00         166.35         181.47         18         CIRCULAR         375.05         0.008695         1.77.015         3.50           SHM         10+00.00         187.62         184.43         18         CIRCULAR         1720.65         0.003574         2.18         17.77.015         3.50           SHM         II         10+00.00         18	<b>(*)</b>	MUS SHM		133.40	2+01-00	137.44	18	CIRCULAR	201.00	0.312139	1.17	. 015	10.00	9.46
WOR         SHW         11464.0°         142.26         21110.00         15         CIRCULAR         1146.0°         0.005881         1.77.015         6.99           WOR         SHW         23+10.0°         152.0°         152.0°         16.33         177.015         7.97           WOR         SHW         23+10.0°         157.5°         36+00.0°         157.5°         16         CIRCULAR         720.0°         0.007638         1.77.015         7.97           WOR         SHW         30+20.0°         157.5°         36+00.0°         166.35         36+00.0°         166.35         177.015         7.91         7.97           SHW         30+20.0°         166.35         36+00.0°         166.35         36+00.0°         166.35         36+00.0°         166.35         177.015         7.91           SHW         30+00.0°         166.35         181.47         18         CIRCULAR         375.0°         0.005695         1.77.015         4.50           SHW         110         144.43.0°         181.47         18         CIRCULAR         1720.6°         0.003571         2.18.015         7.25           SHW         VIN         0.000.0°         187.6°         196.0°         0.003571         2.18.01		MUR SHM		137.44		142.26	18	CIRCULAR	963.00	0.005005	1.77		9 9	4.16
MOR         SHM         23+10.00         152.00         23+10.00         152.00         152.00         152.00         157.50 <td></td> <td>NHS 60M</td> <td></td> <td>142.26</td> <td>21+10.00</td> <td>149.00</td> <td>16</td> <td>CIRCULAP</td> <td>1146.00</td> <td>0.005881</td> <td>1.77</td> <td>.015</td> <td>66.9</td> <td>4.52</td>		NHS 60M		142.26	21+10.00	149.00	16	CIRCULAP	1146.00	0.005881	1.77	.015	66.9	4.52
WOR SHW         23+10+00         152+00         30+30+00         157.50         1F         CTRCULAR         720+00         0+00763B         1+77+015         7-97           WOR SHW         30+20+00         157.50         36+00+00         166+35         166+35         15         CTRCULAR         570+00         0+015526         1+23+015         0+98           SHW         3+R5+0C         172+27         14+43+00         181+47         18         CTRCULAR         175+0C         0+015376         1+73+015         0+95           SHW         14+43+0C         181+47         18         CTRCULAR         1720+65         0+004695         1+77+015         0+95           SHW         14+43+0C         181+47         31+63+65         187-62         2C         CTRCULAR         1720-65         0+003574         2-18+015         7+26           SHW         WIN         0+000-00         187-62         1494-65         18         CTRCULAR         1720-65         0+003571         2-18+015         7+26           SHW         WIN         0+000-00         187-62         1494-65         15         CTRCULAR         1720-65         0+003571         2-18+015         7+26           SHW         1496-00         194-65		MUR SHM		145.00	23+10.00	152.00		DROP MANHOLE						
WOR SHW         30+30.00         157.50         34+00.00         166.35         15         CIRCULAR         570.00         0.015526         1.23 .015         0.98           SHW         0+00.00         166.35         3485.00         172.27         15         CIRCULAR         385.00         0.015376         1.23 .015         6.95           SHW         3+R5.0C         172.27         14443.00         181.47         18         CIRCULAR         1058.00         0.008695         1.77 .015         9.50           SHW         14443.0C         181.47         20         CIRCULAR         1720.65         0.003574         2.18 .015         7.26           SHW         WIN         0+000.00         187.62         186.32         20         CIRCULAR         196.00         0.003571         2.18 .015         7.25           SHW         WIN         0+000.00         187.62         18         20         CIRCULAR         196.00         0.003571         2.18 .015         7.25           SHW         WIN         0+006.00         187.62         194.65         15         CIRCULAR         725.00         0.016.701         1.23 .015         7.24	•	MHS FOW		152.00		157.50	18	CIRCULAR	720.00	0.007638	1.17	• 01 5	1.97	5.15
SHM         0+00.00         166.35         3+85.00         172.27         15         CIRCULAR         3A5.00         0.015376         1.23 .015         6.95           SHM         14443.00         181.47         18         CIRCULAR         1720.65         0.003574         2.18 .015         3.50           SHM         11443.00         181.47         186.00         20         CIRCULAR         1720.65         0.003574         2.18 .015         7.25           SHM         11443.00         187.62         20         CIRCULAR         196.00         0.003571         2.18 .015         7.25           SHM         11443.00         187.60         164.65         16         CIRCULAR         196.00         0.003571         2.18 .015         7.25           SHM         110         1446.00         194.65         16         CIRCULAR         1726.00         0.003571         2.18 .015         7.24		MOR SHM		157.50		166.35	15	CIRCULAR	570.00	0.015526	1.23	510.	9.0	4.51
SHM         3+FE.OC         172.27         14+43.00         181.47         18         CT3CULAP         1058.00         0.008695         1.77 .015         3.50           SHM         14+43.0C         181.47         181.62         20         CTRCULAP         1720.65         0.003574         2.18 .015         7.25           SHM WIN         0+00.00         187.62         188.32         20         CTRCULAP         196.00         0.003571         2.18 .015         7.25           SHM WIN         1+96.00         188.32         35         15         CTRCULAP         379.00         0.016701         1.23 .015         7.24           SHM WIN         5+75.00         194.65         13+00.00         196.72         20         CTRCULAP         725.00         0.016701         1.23 .015         7.24		SHR	0+00+0	166.35		172.27	15	CIRCULAR	385.00	0.015376	1.23	10.	96.9	6.49
SHW IN 0+00.00 187.62 187.62 20 CIRCULAP 1720.65 0.003574 2.18 .015 7.26 5HW IN 0+00.00 187.62 1+96.00 188.32 20 CIRCULAP 196.00 0.003571 2.18 .015 7.25 SHW WIN 1+96.00 198.32 5+75.00 194.65 13+00.00 196.72 20 CIRCULAP 725.00 0.002855 2.18 .015 5.48		SHM	3+85.00	172.27		181.47	18	CIRCULAR	1058.00	0.008695	1.77	.015	9.50	5.49
SHW WIN 0+00.00 187.62 1+96.00 188.32 20 CIRCULAR 196.00 0.003571 2.18.015 7.25 SHW WIN 1+96.00 188.32 5+75.00 194.65 13+00.00 196.72 20 CIRCULAR 725.00 0.002855 2.18.015 5.48		SHM	14443.00	181.47		187.62	20	CIRCULAP	1720.65	0.003574	2.18	• 01 5	7.26	4.69
SHW WIN 1+96.CO 1P8.32 5+75.00 194.65 15 CIRCULAR 379.CO 0.016701 1.23 .015 7.24	9	SHW WIN				188.32	20	CIRCULAR	196.00	0.00 3571	2.18		7.25	4.69
SHW WIN 5+75.00 194.65 13+00.00 196.72 26 CIRCULAP 725.00 0.002855 2.18 .015 5.48	6	SHM WIN				194.65	15	CIRCULAR	379.00	0.016701	1.23		7.24	4.68
	5	NIN MHS		194.65	13+00.00	196.72	20	CIPCULAP	725.00	0.002855	2.18		9 * •	4.19

TABLE A-1 MCC INTERCEPTORS NORTH SYSTEM

SECT	707	FROM	INVERT (FT)	STATION	INVERT (FT)	SI ZE (IN)	SHAPE	LENGTH (FT)	SLOPE	AREA (50°T)	Z	CAPACITY (C= S)	(MGD)
25	SHM WIN	13+00.00	156.72	22+25.00	206.47	9.	CIRCULAR	925.00	0.010540	1.11	5 10 .	9.36	6.05
75	SHM WIN	22+25.00	206.47	25+67.00	210.73	18	CIRCULAR	342.00	0.012456	1.77	. 01 5	10.17	6.57
75	SHE WIN	25+67.00	210.73	34+91.00	214.81	50	CIRCULAR	924.00	0.004415	2.18	. 315	8.06	5.21
25	SHM WIN	34+91.00	214.81	34+91.00	220.11		DROP MANHOLE						
25	SHE WIN	34+91.00	220.11	37+62.00	224.26	15	CIRCULAR	271.00	0.015313	1.23	.015	96.9	4.49
2	SHM MIN	37+62.00	224.26	51+22.00	228.14	50	CIRCULAR	1360.00	0.002852	2.18	• 015	6.48	4.19
75	SHM WIN	51+22.00	228.14	51+46.00	228.54	16	CIRCULAR	24.00	0.016667	1.40	• 015	9.54	5.52
75	SHM #1N	51+46.00	226.54	52+77.31	228.91	20	CIRCULAR	131.31	0.002817	2.18	.015	5.45	4.17
25	SHM WIN	52+77.31	228.91	52+77.31	229.25		DROP MANHOLE						
75	SHM WIN	52+77.31	225.52	54+56.28	229.25	20	CIRCULAR	178.97		2.18	9 10 •		
92	WAK REA	11+47.50	229.25	25+00.00	201.38	16FM	CIRCULAR	1352.50		1.40	• 10 •		
92	WAK REA	25+00.00	201.38	25+50.00	164.80		PUMP STATION	20.00					
92	WAK REA	25+50.00	164.80	26+46.70	173.80	36	CIRCULAR	96.70	0.093071	7.07	.015	176.70	114.20
36	WAK REA	26+46.70	173.80	40+05-17	174.70	24 X27	EXT. CIRCLE	1358.47	0.000662	3.64	.015	01.0	3.98
11	ARL	0+00+0	109.30	25+71.00	110.33	36 X42	EXT. CIRCLE	2571.00	0.000000	8.57	.016	14.00	9.05
11	ARL	25+71.00	110.33	30+98-55	110.54	2-30	CIRCULAR	527.55	0.000398	9.82	910.	13.34	8.62
92	MFD ARL	00.00+0	110.54	0+37.50	110.55	2-30	CIRCULAR	37.50	0.000266	9.82	910.	10.88	7.03
18	MFD ARL	0+37.50	110.55	2+18.24	111.25	16.20	NOHAIS	180.74	0.003872	3.58	• 100	9.55	6.17
18	MFD ARL	2+18-24	111.25	5+47.00	111.38	2-30	CIRCULAR	328.76	0.000395	9.82	910.	13.34	8.62
18	MFD ARL	5+47.00	1111.38	38+28.52	112.49	36 X42	EXT. CIPCLE	2781.52	0.000399	8.57	.016	14.00	9.05
4	ARL	0.00.00	118.50	2+21.00	124.07	20	CIRCULAR	221.00	0.025203	2.18	• 10 •	19.27	12.45
62	ARL	2+21.00	124.07	10+72.00	126.19	54	CIRCULAR	A51.C0	0.002491	3.14	. 01 5	9.80	6.33

TABLE A-1 MDC INTERCEPTORS NORTH SYSTEM

API         17760-06         1756-06         1	SECT	רטכ	STATION	INVERT (FT)	10 STATION	INVERT (F T)	SI ZE	SHADE	LENGTH (FT)	SLOPE	SOUT)	CAPACITY (C= S)	(MGD)
APL         177-60-56         137-83         24         CHECLAR         1139-05         0.005267         3.14 -015         114-25           APL         334-64-06         139-48         25         CHECLAR         490-05         0.019277         2.18 -015         10-86           APL         334-64-06         146-43         33-23-06         153-27         26         CHECLAR         490-05         0.019277         2.18 -015         10-86           APL         334-64-06         146-43         33-27-06         153-27         76         CHECLAR         125-06         0.019277         2.18 -015         11-86           APL         334-64-06         153-27         37-00-06         153-27         77-06         CHECLAR         27-06         0.005-26         2.18 -015         2.11-16           APL         34-65-07         113-02         43-7-06         113-02         43-7-06         113-02         43-7-06         2.18 -015         2.11-16           APL         34-65-07         113-02         43-7-06         144-77         2-10         CHECLAR         25-06         0.005-26         2.18 -015         2.18 -015         3-18           APL         4-37-06         14-37         14-47         2-10         <	0	AP.	10+72-00		17460.95	113.61	36	CIPCULAR	688.95	0.011089		12.78	8.26
4PL         334-GROOF (130-R)         139-R5         139-R5         139-R5         139-R5         149-R5         140-CULAR         125-CO         0.019277         2.16 G10 G10         10-88           4PL         334-GROOF (140-42)         145-22         34-27-30         153-27         20         CH2CULAR         125-CO         0.00592         2.18 G10         2.11           4PL         358-37-30         153-22         37-93-30         153-20         37-93-30         153-20         20         CH2CULAR         27-CO         0.00592         2.11         0.10           4PL         358-37-30         113-30         113-30         2.2         CH2CULAR         27-CO         0.00592         2.18 G10         2.11           4PL         358-37-30         113-30         2.2         CH2CULAR         27-CO         0.01240         2.13         0.10           4PL         4-43-70         113-40         114-77         114-77         114-77         2.10         CH2CULAR         2.2         0.01240         2.13         0.10         0.01240         2.13         0.13         0.13         0.13         0.13         0.13         0.13         0.13         0.13         0.13         0.13         0.13         0.13         <	0	AP.	17+60.95	133.83	20.00.00	139.83	24	CIRCULAR	1139.05	0.005267		14.25	9.21
4PL         335-3-0.0         155.2-2         375-3-0.0         153.2-2         375-3-0.0         153.2-2         375-3-0.0         153.2-2         375-3-0.0         153.2-2         375-3-0.0         153.2-2         375-3-0.0         153.2-2         375-3-0.0         153.2-2         375-3-0.0         155.00         20         175-0.0         375-0.0         133-3-2         375-3-0.0         155.00         20         175-0.0         375-0.0         113-3-2         375-3-0.0         113-3-2         375-3-0.0         113-3-2         375-3-0.0         113-3-2         375-3-0.0         113-3-2         375-3-0.0         113-3-2         375-3-0.0         113-3-2         375-3-0.0         113-3-2         375-3-0.0         113-3-2         375-3-0.0         113-3-2         375-3-0.0         113-3-2         375-3-0.0         113-3-2         375-3-0.0         113-3-2         375-3-0.0         113-3-2         375-3-0.0         113-3-2         375-3-0.0         113-3-2         375-3-0.0         375-3-0.0         375-3-0.0         375-3-0.0         375-3-0.0         375-3-0.0         375-3-0.0         375-3-0.0         375-3-0.0         375-3-0.0         375-3-0.0         375-3-0.0         375-3-0.0         375-3-0.0         375-3-0.0         375-3-0.0         375-3-0.0         375-3-0.0         375-3-0.0         3	02	744	29+00-00	139.83	33+98.00	149.43	20	CIRCULAR	498.00	0.019277		16.86	10.90
API         35+73-00         15:22         37+03-00         155+00         20         CIPCULAR         770-00         0.000502         2.18 .015         9-96           API         0+000-00         113-40         113-40         113-40         113-40         20         CIPCULAR         75-00         0.001240         2.18 .015         9-27           API         4+37-00         113-40         113-40         2-10         CIPCULAR         75-00         0.001240         2-18         0.11         0.27           API         0+00-00         15-14         15-80         2-2         CIPCULAR         72-00         0.001240         2-18         0.11         0.13         0.13         0.13         0.13         0.13         0.10         0.10         0.13         0.13         0.13         0.10         0.13         0	0	APL	33+56.00	145.43	35+23.00	153.22	20	CIRCULAR	125.00	0.030320	10.	21.14	13.66
APPL         OFFORTOR         113-43         149-50         113-62         2-1         CTPCUAR         7-5,60         0.001240         2-11         0.10         0.001240         2-11         0.10         0.001240         0.001240         0.11         0.001240         0.11         0.001240         0.11         0.11         0.001240	•	APL	35+23.00	153.22	37+93.00	155.00	20	CIPCULAP	270.00	0.006592	10.	9.86	5.37
40.         33.956.C         112.90         4437.00         114.77         2-10         CTH CLUAR         42.00         0.020238         1.10.015         5.13           40.         44.37.00         112.41.40         115.80         2-10         CTH CLUAR         42.40         0.006.95         3.14.015         10.38         1.27           APL         0.000.00         155.10         155.80         2-2         CTH CLUAR         22.00         0.006.95         3.14.015         10.38         1.23           APL         0.000.00         155.10         155.40         2-2         CTH CLUAR         22.00         0.007272         6.28.015         10.38         1.27           APL         0.005.00         155.40         2-2         CTH CLUAR         22.00         0.016711         2.18.015         1.05.00	•	ARL	0.00.00	113.43	3+45.00	113.92	20	CIRCULAR	365.00	0.001240		4.27	2.76
API         4+33 Co.         116+77         12+61-80         20         C13 CLACULAR         42+0         C001248         2-18-015         6-27           API         0+060-00         155-00         155-16         24         C12 CULAR         22+00         0+007272         6-28-015         314-015         10-38         1           API         0+045-00         155-14         0+65-00         155-14         0+65-00         150-05         3-14-015         10-38         1           API         0+045-00         155-14         25-24         C12 CULAR         22-00         0+00705         3-14-015         10-38         1           API         0+65-00         155-44         2+62-00         155-44         2-24         C12 CULAR         17-00         0+00705         3-14-015         10-38           API         2+42-00         155-44         2+000-00         155-44         2-24         C12 CULAR         17-00         0+01705         3-14-015         10-36           API         15-42-00         155-44         2-24         C12 CULAR         72-00         0+00000         3-14-015         11-05         11-05           API         15-40-00         17-00         17-00         17-00         17-	•	APL	3+95.00	113.92	4+37.00	114.77	2-10	CINCULAR	45.00	0.020238	10.	5.33	3.44
ANI 0.000.00 155.00 155.10 2.0 C13CULAP 22.00 0.0007056 3.14 .015 10.38 1 10.3	6	APL	4+37.00	114.77	12+61.80	115.80	50	CIRCULAR	924.80	0.001248		4.27	2.76
API         0+53-00         155.32         2-24         CIRCULAP         22.00         0.037272         6.28 .015         33.50         2           API         0+45.00         155.34         2-4         CIRCULAP         17.00         0.007272         6.28 .015         13.50         1           API         0+65.00         155.44         2-4         CIRCULAP         17.00         0.016511         2.18 .015         15.05         1           API         2+42.00         155.44         2-7         CIRCULAP         17.00         0.016511         2.18 .015         15.05         1           API         13-41.00         175.00         20         CIRCULAP         724.00         0.016611         2.18 .015         15.05         1           API         13-41.00         177.50         20         CIRCULAP         724.00         0.016611         2.18 .015         11.06           API         13-41.00         177.50         177.50         20         CIRCULAP         724.00         0.019661         2.18 .015         11.06           API         13-41.00         177.50         177.50         177.50         20         CIRCULAP         724.00         0.019660         2.18 .015         17.09	0	JH4.	0 • • • • • • • • • • • • • • • • • • •		0+23.00	155.16	24	CIRCULAP	23.00	0.006956		10.38	10.59
API         0+65-00         155-44         2+4         2+4         CIPCULAF         17.00         0.0070584         3.14 .015         16.50           API         0+65-00         155-44         2+42.00         156-43         2+42.00         156-44         2+42.00         156-40         2+42.00         156-40         2+42.00         156-40         2+42.00         156-40         2+42.00         156-40         2+42.00         156-40         2+42.00         156-40         2+13.00         156-50         15-50	0	ARL	0+23.00	155.16	0+45.00	155.32	2-24	CIRCULAP	22.00	0.007272		33.50	21.65
APL         2442.00         158.43         20         CTPCULAF         193.00         0.016611         2.18 .015         13.65           APL         2442.00         156.44         2442.00         165.97         20         CTPCULAF         425.00         0.017741         2.18 .015         13.65           APL         13491.00         173.00         17491.00         173.00         17491.00         177.50         20         CTRCULAF         724.00         0.023684         2.18 .015         11.90           APL         13491.00         177.50         176.41         20         CTRCULAF         724.00         0.023684         2.18 .015         11.90           APL         13491.00         177.50         <	0	1d¶	0+42.00		0+62.00	155.44	54	CIPCULAP	17.00	0.007058	10.	16.50	10.66
APL         2+42.0 C I         156.4 3         6+67.00 I         165.97         20         CIPCULAR         425.0 C         0.017741         2.18 .015         11.96           APL         6+67.0 O         156.9 T         175.0 O         177.5 O <td>0</td> <td>101</td> <td>0462.00</td> <td>155.4</td> <td>2+42.00</td> <td>158.43</td> <td>20</td> <td>CIRCULAR</td> <td>193.00</td> <td>0.016611</td> <td></td> <td>15.65</td> <td>10.11</td>	0	101	0462.00	155.4	2+42.00	158.43	20	CIRCULAR	193.00	0.016611		15.65	10.11
APL         C6467.00         155.97         13491.00         173.00         173.00         173.00         173.00         173.00         173.00         173.00         173.00         173.00         177.50		ARL	2+42.60	156.43	6+67.00	165.97	2.0	CIPCU_AP	425.00	0.017741	10.	115.17	13.45
APL         13+51.00         177.50         15+91.00         177.50         177.60         177.50         177.50         177.60	0	ARL	6+67.00		13+91.00	173.90	20	CIRCULAR	124.00	602600-0		11.90	1.73
APL         15+P1:00         177:56         16+85:00         178:54         24         CIPCULAP         125:00         0.019680         2.18 .015         17.03           APL         16+85:00         176:54         19+10:00         181:00         181:00         20         CIRCULAP         125:00         0.019680         2.18 .015         17:03           APL         21+94:00         184:07         20         CIRCULAP         215:00         0.0107995         2.18 .015         10:08           APL         21+94:00         186:50         24:09:00         185:50         24:09:00         186:50         24:09:00         186:50         24:09:00         25:00         CIRCULAP         215:00         0.005651         3:14 .015         10:02           ARL         24:09:00         186:50         24:05:00         186:50         24:00:00         25:00:00         0.005651         3:14 .015         10:02           ARL         24:09:00         186:50         20:00:00         195:53         20:00:00         CIRCULAR         506:00         0.0036651         3:14 .015         10:00           ARL         24:00:00:00         186:50         24:00:00         195:53         20:00:00:00:00:00:00:00:00:00:00:00:00:0	0	ARL	13+61-00		15+91.00	177.50	20	CIRCULAR	160.00	0.023684	.01	13.68	12.07
APL         16+85.00         176.54         19+10.00         181.00         20         CIRCULAR         125.00         0.019680         2.18 .015         17.03           APL         18+10.00         181.00         184.07         20         CIRCULAR         384.00         0.030795         2.18 .015         10.85           APL         21+94.00         185.50         24 0.00         185.50         24 0.00         185.50         24 0.00         186.50         24 0.00         186.50         24 0.00         186.50         24 0.00         186.50         24 0.00         186.20         20 0.00         20.	0	ARL	15+81.00		16+85.00	178.54	24	CIRCULAP	104.00	0.010000	10.	19.64	12.69
APL         18+10.00         181.00         21+94.00         184.07         2C         CIRCULAR         384.00         0.002651         2.18.015         10.85           APL         21+94.0         184.00         185.5         24         CIRCULAR         215.0         0.005651         3.14.015         15.02           ARL         24+09.0         185.5         24         CIRCULAR         506.0         0.005651         3.14.015         15.20           ARL         24+09.0         186.5         20         195.5         20         CIRCULAR         506.0         0.017845         2.18.015         16.20           ARL         24+09.0         195.5         30+98.0         204.9         20         CIRCULAR         506.0         0.051202         2.18.015         16.20	0	APL	16+85.00	176.54	19+10-00	181.00	20	CIRCULAR	125.00	0.019680		17.03	11.01
APL         21+94.CC         184.07         24+09.00         185.50         24         CTRCULAR         215.CO         0.005651         3.14.015         15.02           ARL         24+09.CC         186.50         24+05.00         186.50         20         CTRCULAR         506.CO         C.017845         2.18.015         16.20           ARL         29+15.0C         195.53         30+98.0D         204.9D         20         CTRCULAR         506.CO         C.017845         2.18.015         16.20	0	APL	18+10.00		21+94.00	184.07	36	CIRCULAR	384.00	0.107995			10.7
ARL 24+09.00 185.50 24+05.00 186.50 FROP WANHOLF  ARL 24+09.00 186.50 29+15.00 195.53 20 CIMCULAR 506.00 0.051202 2.18 .015 27.48  ARL 29+15.00 195.53 30+98.00 204.90 20 CIRCULAR 183.00 0.051202 2.18 .015 27.48	9	ARL	21+94.00		24+09.00	185.50	24	CIRCULAR	215.00	0.006651		10.02	10.35
ARL 20415.0C 195.53 30498.0C 204.9C 20 CIRCULAR 506.CD C.017845 2.18 .015 16.20 ARL 20415.0C 195.53 30498.0C 204.9C 20 CIRCULAR 183.CO 0.051202 2.18 .015 27.48	0	ARL	24+00.00		24+05-00	186.50		CROP MANHOL	u.				
29+15.00 195.53 30+98.00 204.90 20 CIRCULAR 183.00 0.051202 2.18 .015 27.48	0	784	24+09.00		29+15.00	195.53	20	CINCULAR	506.00	C.017845		16.20	10.47
	0	APL	29+15.00		30+98.00	204.90	50	CIRCULAR	183.00	0.051202		27.48	17.76

TABLE A-1 MDC INTERCEPTORS NORTH SYSTEM

SFCT	۲٥٥	FROM STATION	INVERT (FT)	TO STATION	INVERT (FT)	512E (1N)	SHAPE	LENGTH (FT)	SL 0.3E	AREA (SQ=T)	Z 7 1 4 1	CAPACITY (C=S) (	( MGD)
30E	APL	0 • 00 • 0	186.50	1+55.00	193.40	12	CIRCULAR	155.00	0.044516	. 79	• 01 5	6.52	4.21
80	AP.	1+55.00	193.40	3+80.00	202.84	15	CIRCULAR	225.00	0.044516	. 79	• 01 5	0.52	1.21
18	FLN	0+00+0	103.46	31+41.00	1 06 . 89	30	CIRCULAR	3141.00	0.001092	4.91	.015	11.09	7.17
18	BLA	31+41.00	106.89	0+34.82	107.20	30	CIRCULAR	341.00	606000000	16.4	9 10 •	10.12	6.54
	BL4	34+82.00	107.20	35+04-00	107.24	3-16	CIRCULAR	22.00	0.001818	4.20	• 01 5	8.46	5.47
	<b>8</b>	35+04.00	107.24	35+80.00	107.39	30	CIRCULAR	76.00	0.001973	4.91	. 01 5	14.91	9.64
82	ARL	0 • 00 • 0	204.95	8+78.00	210.80	20	CIRCULAR	878.00	0.006662	2.18	• 01 5	16.6	6.40
82	AR.	R+78.00	210.80	8+ 78.00	215.45		DROP MANHOLE						
82	ARL	8+78.00	215.45	11+45.00	220.82	20	CISCULAP	267.00	0.020112	2.18	• 01 5	17.22	111.13
82	AP.	11+45.00	220.82	11+98.00	228.65	20	CIRCULAR	53.00	0.147735	2.18	.015	19.94	30.16
82	APL	111+98.00	228.65	13+85.00	232.34	50	CIRCULAR	187.00	0.019732	2.19	.015	17.05	11.02
82	ARL	13+85.00	232.34	13+85.00	238.46		DROP MANHOLE						
85	AR.	13+85.00	238.46	21+24.00	243.25	50	CIRCULAR	139.00	0.006481	2.18	• 01 9	6.17	6.31
83	ARL LFX	0+00•00 ×	243.29	25+12.88	253.34	50	CIRCULAR	2512.88	0.003999	2.18	• 01 5	7.68	4.96
:	LFX	0+00+0	253.51	3+25.00	16.835	33	CIRCULAR	125.00	0.301230	5.94	5 10 .	15.10	13.41
•	LEX	3+25.00	16.535	*****	254.86	1-12.2-21	SIPHON	115.00	0.008260	19.6	5 10.	50.85	13.47
	LFX	4+40.00	254.86	11+71.70	255.87	E:	CIRCULAR	731.70	0.001380	5.94	\$ 10.	17.06	11.03
93	רנא	00.0000	255.87	33+40.00	260.23	33	C IRCU_AR	3340.00	0.001305	5.94	5 10 .	16.50	10.66
50	LEX	33+40.00	266.23	33+40.00	260.48		DROP MANHOLE						
6.5	LFX	33+40.00	260.48	66+53.00	266.26	30	CIRCULAR	3313.60	0.001744	16.4	\$10.	14.87	9.61
88	LEX	96+53.00	266.26	66+53.00	266.36		4 4 0 0 0				10.		
8	7	66+53.00 266.36	266.36	116+72.48	274.11	90	CIRCULAR	5019.43	0.001543	6.	. 01 5	13.90	9.98

TABLE A-1 MDC INTERCEPTORS NORTH SYSTEM

SFCT	٦٥٦	FROM STATION	INVERT (FT)	STATION	INVERT (FT)	SIZE (IN)	SHADE	(F1)	S_02E	NNAM A35A (S3=T) N	N CAPACITY	( MGD)
9	2	0.00+0	118.02	3+43.00	119.45	30	CIRCULAR	343.00	9.004169	910. 16.4	6 21.55	13.93
84	7	3+43.00	115.45	49+67.26	132.66	30	CINCULAR	4624.26	0.302640	4.91 .016	6 17.15	11.08
44	MAL FVF	0+00+0	92.32	82+15.00	98.40	54	CIRCULAP	R215.00	0.000740	15.90 .015	5 46.49	30.05
œ a.	604	0+00+0	129.86	66+45.00	137.86	*	CIRCULAR	6645.00	0.001205	12.57 .015	5 \$3.30	27.98
ď	MON	66+45.00	137.86	66445.00	138.36		CHOP MANHOLF					
e e	80.	66+45.00	138.36	66+84.82	138.42	4	CIRCULAR	34.82	905100.0	9.62 .015	5 33.91	21.92
6	NOB	0+00+0	138.42	42+18.00	144.90	45	CIRCULAP	4218.00	0.001536	9.62 .015	5 34.26	22.14
60	80%	42+18.CO	144.90	42+18.00	145.40		DROP MANHOLF					
6	W08	42+18.00	145.40	57+84.71	147.58	36	CIRCULAP	866.71	0.002515	7.07 .015	5 23.04	18.77
00	NOE WIL	0+00+0	147.58	36+86.00	156.50	36	CIRCULAP	1686.00	0.002419	7.07 .015	5 28.50	18.42
06	WOB WIL	36+86.00	156.50	36+86.00	157.01		DROP MANHOLE					
60	WOB WIL	36+86.00	157.01	44 +4 0 • 0 0	158.83	30	CIRCULAR	754.00	0.302413	4.91 .015	5 17.52	11.32
06	WOS WIL	44+40.00	156.83	58+24.00	162.95	30	CIRCULAR	1384.00	0.002976	4.91 .015	5 19.43	12.56
06	WOB WIL	58+24.00	162.95	73+47.00	168.20	30	CISCULAB	1523.00	0.003448	4.91 .015	5 20.91	13.51
00	NOB WILL	73+47.00	166.20	86+60.00	170.59	30	CIRCULAR	1313.00	0.001818	4.91 .01 5	5 13.18	9.81
A16	MFD	0400+0	105.00	A++1.00	105.48	99	CIRCULAP	941.00	0.000570	23.76 .015	69.60	86.11
416	O.A.	8++1.00	105.48	8+41.00	105.98		DROP MANHOLE					
416	MFD	8++1.00	105.08	31+06.00	107.25	60	CIRCU_AP	2265.00	0.000564	19.64 .015	5 53.70	34.71
916	MFD ARL	31+06.00	107.25	31+16.00	107.26	09	CIRCULAR	10.00	0.001000	19.64 .01 5	5 71.53	46.23
916	MFD ARL	31+16.00	107.26	37+10.00	109.80	2-33	NOHOIS	204.00	0.304276	11.88 .015	5 51.29	33.15
916	MFD ARL	37+10.00	105.80	64+43.00	121.80	*	CIPCULAR	2733.00	0.004390	15.90 .015	5 113.10	73.09
45	ARL	0.00.00	121.80	00.00.00	127.50		DPOP MANHOLE					

TABLE A-1 MDC INTERCEPTORS NORTH SYSTEM

3 6 6 6	707	SIATION	(FT)	STATION	12.50	(2.2)		(FT)		(SO=T)	z	(C= S)	(MGD)
	196	0+00+0	127.50	39+90.00	162.09	*	CIRCULAR	3990.00	0.008669	9.62	• 10 •	81.30	52.54
	ARL	39+90.00	162.09	39+90.00	162.59		DROP MANHOLF						
63	ARL	39+90.00	162.59	58+40.00	187.68	36	CIRCU_AP	1850.00	0.013562	7.07	• 01 5	57.40	43.56
	APL LEX	00.00+0	187.68	21+21.00	205.10	36	CIRCULAP	2121.00	0.008213	7.07	• 01 5	52.49	33.92
93	ARL LEX	21+21.00	205.10	21+28.00	209.72	36	CISCULAR	7.00	0.00099.0	70.7	• 015	470.50	304.07
63	ARL LFX	21+28.00	205.72	22+51.00	210.24	36	CIRCULAR	123.00	0.004228	7.07	• 01 5	37.66	24.34
63	APL LFX	22+51.00	210.24	22+59.00	213.35	36	CIRCULAP	B. CO	0.388750	7.07	\$10.	361.10	233.37
93	APL LEX	22+59.00	213.35	24+91.00	214.31	36	CIPCULAR	232.00	0.104138	7.07	.015	37.20	24.04
69	APL LFX	24+91.00	214.31	24+91.00	221.00		DROP WANHOLF						
63	ARL LFX	24+91.00	221.00	25+22.50	221.06	36	CIRCULAR	31.50	906100.0	7.07	7.07 .015	25.20	15.29
<b>E</b> ?	APL LEX	25+22.50	221.06	25+22.50	230.37		PROP MANHOLE						
69	ARL LFX	25+22,50	71.062	26+95.00	231.05	36	CIRCU_AR	172.50	0.003942	7.07	7.07 .015	35.30	23.46
93	APL LFX	26+95.00	231.05	26+95.00	29.952		DEOP MANHOLE						0.7.4
93	ARL LFX	26+95.00	239.92	60+16.00	253.09	36	CIRCULAR	3321.00	0.003766	7.07	210. 70.7	36.40	23.52
456	**	0400.10	98.41	04.98.0	98.44	53X34	REC TANGUL AR	77.10	0.000389	12.51	. 01 3	25.68	16.60
456	MAL	0+86.85	5 P. 4 4	2+93.20	98.51	4	CIRCULAR	206.40	0.000339	12.57	• 01 3	26.50	17.13
95	MAL	3+03-75	56.53	7+30.00	16.86	42	CIRCULAR	426.25	0.000891	9.62	.01 3	30.09	19.45
9.0	-	7+30.00	56.91	11+27-63	99.26	45	CIPCU_AR	397.63	0.000880	9.62	• 01 3	29.90	19.32
\$6	4.4.	111-27-63	98.56	11+27.63	99.34		CROP MANHOLF						
\$	PA.	111-27.63	05.34	16+25.00	49.66	36	CIRCU_4R	497.37	0.000603	7.07	.013	15.40	10.60
\$	HAL	16+25.00	99.64	24+05-00	10001	36	CIRCULAR	783.00	0.0006 79	7.07	. 01 3	17.41	11.25
56	MAL	24+05.00	10001	33+20.00	100.72	34	CIRCULAR	915.00	0.000601	7.07	. 01 3	16.38	10.59

TABLE A-1 MEC INTERCEPTORS NORTH SYSTEM

33+70,ffc         166.72         4f+12.94         101.54         36         76.72         101.54         37         770.75         101.59         4f+12.94         102.37         770.75         102.44         770.75         102.98         770.75         102.98         770.75         102.98         770.75         102.98         770.75         102.98         770.75         102.98 <th>7 (1=05)</th> <th>(CFS) (MGD)</th>	7 (1=05)	(CFS) (MGD)
101-54   44+12-94   102-39   27   CI4CU_AE   77   102-39   102-39   27   CI4CU_AE   77   102-39   10	.94 0.100634 7.07 .013	16.80 10.86
1023.39 63489,69 103.38 27 CIHCULAR 192.39 63489,69 104.08 72435.15 105.88 77 CIPCULAR 194.00 107.26 77452.13 108.39 77 CIPCULAR 194.01 107.26 77452.13 108.39 77 CIPCULAR 155.47 107400.00 38.47 3-66 SIPHON 110.374.7 107400.00 78.87 3-66 SIPHON 110.374.7 107400.00 78.87 1035x135 HG35540F 77.57.7 43110.00 79.27 1135x135 HG35540F 77.57.7 43110.00 82.95 135 CIRCULAR 37.99.05 21436.00 84.41 135x135 HG35540F 77.99.05 21436.00 84.41 135x135 HG35540F 77.99.05 21436.00 85.01 126.x84 PECTANGULAR 57.99.00 85.01 126.x84 PECTANGULAR 57.99.00 85.01 126.x84 PECTANGULAR 57.99.00 86.17 126.x84 PECTANGULAR 57.99.00 86.10		
102.0P	.75 0.002047 3.94 .013	14.00 9.05
106.00         72+15-15         105.40         77         CIPCULAP         19           107.26         77+52-13         108.04         27         CIRCULAP         51           107.26         77+52-13         108.04         27         CIRCULAP         51           108.35         77+52-13         108.39         24         CIRCULAP         15           108.36         77+52-13         108.39         24         CIRCULAP         15           108.36         78.47         3-60         SIPHON         10           108.37         78.47         3-60         SIPHON         10           176.47         17+00.00         78.84         135x135         HCPSESADE         7           75.27         47+10.00         81.10         135x135         HCPSESADE         7           75.27         47+10.00         84.01         135x135         HCPSESADE         7           84.01         135x135         HCPSESADE         7           84.01         135x135         HCPSESADE         7           84.01         135x135         HCPSESADE         7           84.41         27+92.00         84.41         126         CIRCULAP         7		
106.88         72415.15         107.26         CTRCULAP         51           107.24         77452.13         108.04         27         CTRCULAP         51           108.34         77452.13         108.39         24         CTRCULAP         15           108.35         52486.72         111.00         24         CTRCULAP         15           178.47         10400.00         38.47         3-60         STPHON         10           178.47         107400.00         78.83         135x135         HG25E540F         6           178.24         6450.00         70.27         135x135         HG25E540F         6           179.20         81.10         135x135         HG25E540F         6         37           110         37+00.00         82.95         135x135         HG25E540F         37           111         37+00.00         84.41         135x135         HG2CULAP         37           111         37+00.00         84.40         135x135         HG2CULAP         37           111         37+00.00         84.41         135x135         HG2CULAP         37           111         37+00.00         84.41         135x135         HG2CULAP         37 </td <td>.46 0.001517 3.98 .013</td> <td>12.00 7.76</td>	.46 0.001517 3.98 .013	12.00 7.76
107.26         77452.13         108.04         27         CIRCULAP         51           108.36         77452.13         108.39         ERID WANHOLE         15           108.36         92488.72         111.00         24         CIRCULAP         15           36.47         10400.00         38.47         3-60         SIPHON         10           37.47         10400.00         78.83         3-60         SIPHON         10           76.27         104.00.00         78.83         HG25ES40F         6           76.27         43110.00         81.10         135x135         HG25ES40F         6           41.10         37+00.00         82.95         135x135         HG25ES40F         6           41.10         37+00.00         82.95         135         CIRCULAR         37           42.05         21+36.00         84.41         135x135         HG25ES40F         7           84.01         7+00.00         84.41         135         CIRCULAR         37           84.01         7+00.00         84.41         135         CIRCULAR         7           84.01         7+00.00         84.41         125         CIRCULAR         7           <		
108.34         77452.13         108.39         24         CIRCULAP         15           108.35         92446.72         111.00         24         CIRCULAP         15           36.47         10400.00         38.47         3-60         SIPHON         10           78.47         10400.00         78.83         3-60         SIPHON         10           78.87         12504.23         78.94         135x135         HGPSES40F         7           75.27         43510.00         70.27         135x135         HGPSES40F         6           41.10         37+00.00         82.95         135         CIRCULAR         37           42.01         135x135         HGPSES40F         7           41.10         37+00.00         82.95         135         CIRCULAR         37           42.01         135x135         HGPSES40F         7           84.01         135x135         HGPSES40F         7           84.01         135x135         HGPSES40F         37           84.01         135x135         HGPSES40F         37           84.01         126         CIRCULAR         7           85.01         126         CIRCULAR         5	.98 0.001509 3.99 .013	12.00 7.76
108.35         92.486.72         111.00         24         CIRCULAP         15           19.47         10.000.00         38.47         3-60         SIPHON         10           16.47         10.000.00         78.83         135.135         DRPD WANHOLE         10           79.27         12.000.00         79.27         135x135         HG25E540F         6           75.27         43.110.00         81.10         135         CIRCULAR         35           41.10         37.000.00         82.95         135x135         HG25E540F         6           41.10         37.000.00         82.95         135         CIRCULAR         37           84.01         135x135         HG25E540F         7           84.01         135x135         HG26LAR         37           84.01         135x135         HG20LAR         7           84.01         135x135         HG20LAR         7           84.01         135x135         HG20LAR         7           85.01         126         CIRCULAR         7           85.01         126         CIRCULAR         7           86.01         35.00         86.91         126         CIRCULAR         5 <td></td> <td>* LT 01.10</td>		* LT 01.10
3P.47         10+00.00         3P.47         3-60         SIPHON         10           3F.47         10+00.00         78.83         CR7P WANHOLE         20           7P.34         6+50.00         79.27         135x135         HG35E540F         6           75.27         43+10.00         81.10         135x135         HG35E540F         6           41.10         37+00.00         82.95         135         CTRCULAR         37           42.05         21+36.00         84.41         135x135         HOP5E5H0F         81           84.01         135x135         HOP5E5H0F         21         22           84.01         135x135         HOP5E5H0F         21           84.01         135x135         HOP5E5H0F         21           84.01         135x135         HOP5E5H0F         21           84.01         135x135         HOP5E5H0F         21           85.01         126         CTRCULAR         7           85.01         126         CTRCULAR         7           85.01         126         CTRCULAR         5           86.01         5+00.00         85.01         126         CTRCULAR         5           86.17	.59 0.001/99 3.14 .013	9.34 5.04
36.47         10400.00         78.83         CRTP WANHOLE           74.87         12504.23         78.94         135x135         HG25ES40F         27           76.27         43110.00         81.10         135x135         HG35ES40F         6           41.10         37+00.00         82.95         135         CIRCULAR         37           42.05         21+36.00         84.41         135x135         HD85ES40F         21           84.01         7+00.00         84.41         135         CIRCULAR         7           84.41         22+92.00         85.91         126         CIRCULAR         7           85.41         22+92.00         85.91         126         CIRCULAR         5           86.16         5+00.00         85.91         126.84         6         6           86.17         350.00         85.91         126.84         6         6         6           86.17         5+25.00         86.17         126.84         PECTANGULAR         5         6	.00 58.92 .016	
79.74 (4.50.00) 79.27 (135x135) HGPSESHOF 79.74 (4.50.00) 79.27 (135x135) HGPSESHOF 79.72 (135x135x135) HGPSESHOF 79.72 (135x135x135) HGPSESHOF 79.72 (135x135x135) HGPSESHOF 79.72 (135x135x135) HGPSESHOF 79.72 (135x135x135x135) HGPSESHOF 79.72 (135x135x135x135x135) HGPSESHOF 79.72 (135x135x135x135x135x135x135x135x135x135x		
75.27 43+10.00 81.10 135×135 HD25ES-NF 56  91.10 37+00.00 82.95 135 CIRCULAP 35  92.05 21+36.00 84.01 135×135 HOFSES-NOF 21  84.01 7+00.00 84.01 135×135 CIRCULAP 77  84.01 7+00.00 85.01 126  85.01 5+00.00 85.01 126×84 PECTANGULAP 56  86.17 5+25.00 86.17 IZ6×84 PECTANGULAP	0.000538	102.25 .015 474.10 305.40
75.27 43+10.0C 81.10 135 CIRCULAP 36 41.10 37+00.0C 82.95 135 CIRCULAR 37 42.05 21+36.CO 84.41 135x175 HOPSES-HOF 21 84.01 7+90.CO 84.41 135 CIRCULAR 7 84.41 22+92.CO 85.91 126 CIRCULAR 7 85.41 5+00.CO 85.91 126 CIRCULAR 5 86.17 5+25.CO 86.19 126.X84 PECTANGULAR	0.000500 102.25 .015	457.10 295.41
41.10 37.00.00 82.95 135 CIRCULAR 37. 42.05 21.436.00 84.41 135x135 HOPSESHOF 21 84.01 7.400.00 84.41 126 CIRCULAP 7 84.41 224.92.00 85.91 126 CIRCULAP 15 85.41 54.00.00 85.91 126 CIRCULAR 5 86.17 54.05.00 86.17 126.X84 PECTANGULAP	0.000500 99.40 .015	439.80 284.23
42.05 21+36.00 84.01 135×135 HOPSESHOF 21 84.01 7+90.00 84.41 135 CIRCULAR 7 84.41 22+92.00 85.91 126 CIRCULAR 15 85.91 126 CIRCULAR 5 86.17 5+00.00 86.17 126.884 PECTANGULAR	.00 0.000500 09.40 .015	439.80 284.23
84.01         7+90.00         84.41         135         CIRCULAR         7           84.41         22+92.00         85.91         126         CIRCULAR         15           85.91         126         CIRCULAR         5           86.17         126         CIRCULAR         5           86.17         126         CIRCULAR         5           86.17         126         CIRCULAR         5	.00 0.000500 102.25 .015	457.10 295.41
P4.41         22+92.00         P5.91         126         CIRCULAP         15           P5.91         12f         CIRCULAF         15           P6.1f         5+05.00         86.17         176ANSTTON           P6.17         5+25.00         86.19         126XNA         PECTANGULAP	0.000500 99.40 .015	439.80 284.23
#5.41 5+00.00 85.91 12f (FRCULAR 5 #6.16 5+05.00 86.17 TRANSITION 96.17 5+25.00 86.19 126.884 PECTANGULAP	.CO 0.100498 86.59 .015	515.90 334.06
FE.1F 5+05.00 8K.17 TRANSITION 8K.17 SF25.00 86.19 126.884 PECTANSULAP	.00 0.000500 86.59 .015	365.90 236.47
96.17 5425.00 86.19 126.884 PECTANSULAP	5.00 0.001333	
	20.00 0.301333 73.50 .015	73.50 .015 436.70 282.23
5+25.00 86.19 5+10.00 86.20 TRANSITION 5.	5.00 0.001333	

TABLE A-1 MCC INTERCEPTORS NORTH SYSTEM

100	SECT NO	۲۵۲	FROM	INVER T	STATION	INVERT (FT)	\$17F (1h)	SHADE	L FNGT H	S_0PE	( SO= T)	Z 7 7	CAPACITY (C=S) (	CMGD)
MED   EVE   15+00.00   E1,07   77+06.00   Ra.61   111X111   HUNSFS-HOT   1206.00   0.000530   69.24 .015   277-80   1   1   1   1   1   1   1   1   1		PFD EVE	5+30.00	Pf.20	15+80.00	8K.72	125×126	HO3 SESHOL	1050.00	0.000500	88.63	• 01 5	377.50	243.97
WITH BOTA   11-10-10-10-10-10-10-10-10-10-10-10-10-1	90	MFD EVF	15+80.00	86.72	15+80.00	16.18		CERP MANHOLE						
WED         TYTE	90	MFD EVF	15+80.00	19.18	27+86.00	88.61	111×111	HORSES40F	1206.00	0.000530	69.24	• 01 5	279.80	183.83
HE   EV   11489.0   C   C   C   C   C   C   C   C   C	50	MFD FVE	27+86.00	1 9.84	31+49.00	69.69	2-42 X90	NOHals	403.00	0.002679	41.40	• 015	145.90	94.29
HE   EVE   40.003.0   00.34   22.23.0   00.47   1111   11111   1112	90	MFD EVE	31+89.00	66.69		96.00	111×111	HORSESHUE	814.00	0.000823	69.24	• 01 5	348.60	225.29
WFD         EVE         42.423.00         G0.44         A2.445.00         G0.446         G0.446 </td <td>50</td> <td>MFD EVE</td> <td>40+03.00</td> <td>96.36</td> <td></td> <td>4.00</td> <td>111</td> <td>CIRCULAR</td> <td>220.00</td> <td>0.300500</td> <td>67.20</td> <td>5 10 .</td> <td>261.10</td> <td>168.74</td>	50	MFD EVE	40+03.00	96.36		4.00	111	CIRCULAR	220.00	0.300500	67.20	5 10 .	261.10	168.74
WFD         CFORD         CASAGE	50	MFD EVE	42+23.00	96.47	42+45.00	84.00	111×111	HORSESHOF	22.00	0.000454	69.24	• 01 5	258.90	167.32
WFD         CATAGESION         G1.24         C449Q15         G2.36         G1.24         G449Q15         G2.36         G1.24         G449Q15         G2.36         G1.24         G449Q15         G2.36         G1.24	90	WED EVE	42+45.00	94.00	42+45.00	91.24		DROP WANHOLF						
WFD         0+00+00         92.36         20+56-00         93.38         102X102         HORSFSHCF         2050-00         56.45         61.5         117.20         1           WFD         0+04-00-00         92.36         24-18         3-54         STPHON         352.00         0+002272         47.70         1015         177.20         1           WFD         0+04-00         92.36         94.18         3-54         102X102         HORSESHOF         350.00         0+000-00         56.45         117.20         1	90	MFD EVE	42+45.00	91.24	64+99.15	95.36	102×102	HORSESHUE	2254.15	0.3005.00	58.45	• 01 5	215.80	140.11
WFD         204-56-00         94.18         3-54         SIPHIDN         352-00         0.002272         47.70         107.20           WFD         0+24-02         94.18         3-54         SIPHIDN         352-00         0.0002872         47.70         1015         117.20           WFD         0+24-02         94.18         102X102         HORSESHOE         1300.00         6.000 58.45         0.15         214.20         117.20           WFD         0+000-00         96.81         14470-00         97.75         102X102         HORSESHOE         1870-00         6.000 58.45         0.15         210.80         1           WFD         20+06-00         97.81         102X102         HORSESHOE         1870-00         6.000 58.45         0.15         210.80         1           WFD         20+06-00         97.81         102X102         HORSESHOE         1870-0         0.000560         58.45         0.15         110.20           WFD         20+06-00         97.81         102X102         HORSESHOE         1372-0         0.000560         58.45         0.15         210.80         1           WFD         20+06-00         97.84         102X102         HORSESHOE         1372-0         0.000500	06A	MFD	0.00.00	92.36	20+50.00	93.38	102×102	HORSESHOF	2050.00	0.000500	58.45		216.80	140.11
MFD         0+24.02         94.18         47455.39         95.33         102X102         HORSESHOE         2153.39         0.000468         58.45 .015         214.20           MFD         0+00.00         95.32         37400.00         96.81         102X102         HORSESHOE         3000.00         0.000500         58.45 .015         216.80         1           MFD         0+00.00         95.32         37400.00         97.81         3-54         SIPHCN         136.00         0.000501         58.45 .015         216.80         1           MFD         20+06.00         97.75         102X102         HORSESHOE         1870.00         0.000533         47.70         015         216.80         1           MFD         20+06.00         97.81         102X102         HORSESHOE         684.00         0.001023         58.45 .015         215.80         1           MFD         20+06.00         97.81         102X102         HORSESHOE         684.00         0.001023         47.70         015         215.80         1           MFD         20+06.00         96.55         33+53.06         98.84         102X102         HORSESHOE         673.96         6.00500         58.45 .015         215.80         1	490	WFD	20+50.00	93.36	24+02.00	94.18	3-54	SIPHON	352.00	0.002272	47.70		177.20	114.52
WFD         0+000+00         9£-32         30+000+00         9£-81         102X102         HGRSESHDE         3000+00         6-845         -015         216-80         102X102         HGRSESHDE         3000+00         6-845         -015         215-80         115-80         115-80         115-80         115-80         115-80         115-80         115-80         115-80         115-80         115-80         115-80         110-80         9-90-9         110-90         9-90-9         110-90         9-90-9         110-90         9-90-9         110-90         9-90-9         110-90         9-90-9         110-90         9-90-9         110-90         9-90-9         110-90         9-90-9         110-90         9-90-9         9-9	0.0	MFD	0+24.02	94.18	47+55.39	95.33	102×102	HORSESHOE	2353.39	0.000488	58.45	.015	214.20	138.43
MFD         0+000.00         56.45         102X102         HCRSESHDE         1870.00         0.0006500         58.45         1015.80         215.80           MFD         18470.00         97.75         20+06.00         97.81         3-54         SIPHCN         136.00         0.000441         47.70         1015         61.00           MFD         20+06.00         97.81         20+90.00         98.51         102X102         HORSESHDE         684.00         0.0001023         58.45         1015         110.00           MFD         20+90.00         96.51         27+80.00         98.84         102X102         HORSESHDE         573.96         0.000363         47.70         1015         131.20           MFD         27+80.00         98.84         102X102         HORSESHDE         573.96         0.000500         58.45         115.80         1           MFD         13+72.00         99.83         1C2X102         HORSESHDE         573.96         0.000500         58.45         115.80         1           MFD         13+72.00         99.83         1C2X102         HORSESHDE         573.96         0.000500         58.45         115.30         1           MFD         13+72.00         100.53	30	MED	00.00+0	95.32	30+00.00	96.81	102×102	HORSESHOF	3000.00	0.300500	58.45	• 10.	216.80	140.11
MFD         136.00         97.75         204.006.00         97.81         3-54         STDHCN         136.00         0.000441         47.70         1015         61.000           MFD         204.00.00         97.81         102x102         HORSESHUE         684.00         0.0001023         58.45         115.20         2           MFD         264.90.00         98.51         102x102         HORSESHUE         684.00         0.000363         47.70         1015         31.81           MFD         27480.00         98.84         102x102         HORSESHUE         573.96         0.000500         58.45         115.80         1           MFD         27480.00         99.53         1C2x102         HORSESHUE         573.96         0.000500         58.45         115.80         1           MFD         13472.00         99.53         1C2x102         HORSESHUE         1372.00         0.000500         58.45         115.80         1           MFD         13472.00         100.53         122x102         99.89         HORSESHUE         1372.00         0.000500         58.45         1015         153.30           MFD         13472.00         100.53         122x10.0         99.89         197.99	10	MFD	0+00+0	56.81	19+70.00	97.75	102×102	HORSESHOE	1870.00	0.000500	58.45		215.80	143.11
MFD         20+06.00         97.81         26+90.00         98.51         102X102         HORSESHDE         6F4.00         0.001023         58.45 .015         310.20         2           MFD         26+90.00         9F.51         27+80.00         9R.55         3-54         SIPHON         110.00         0.000363         47.70 .015         53.21           MFD         27+80.00         9F.55         33+53.96         98.84         102X102         HORSESHDE         573.96         0.000500         58.45 .015         215.80         1           MFD         13+72.00         99.53         1C2X102         HORSESHDE         1372.00         0.000500         58.45 .015         215.80         1           WFD         13+72.00         100.53         1C2X102         HORSESHDE         1372.00         0.000489         45.51 .015         215.80         1           WFD         13+72.00         100.53         22+70.00         100.097         97X90         HORSESHDE         10300         0.000489         45.51 .015         153.30           WFD         22+70.00         100.657         97X90         HORSESHDE         1030.00         0.000489         45.51 .015         153.30	10	MFD	18+70.00	97.79	20+06.00	18.76	3-54	SIPHCN	136.00	0.000441	47.70		91.00	39.42
MFD         26+90.00         9P.51         27+80.00         9R.55         3-54         SIPHON         110.00         0.000363         47.70         0.015         53.21           WFD         27+80.00         9E.55         33+53.96         98.84         102X102         HDRSESHDE         573.96         0.000500         58.45         015         215.80         1           MFD         13+72.00         99.53         1C2X102         HDRSESHDE         1372.00         6.000500         58.45         015         215.80         1           WFD         13+72.00         190.53         ERDP MANHOLE         898.00         0.000489         45.51         015         153.30           WFD         22+70.00         100.67         97.89         103.00         90.000489         45.51         015         153.30	10	MFD	20+06-00	97.81	26+90.00	16.86	102×102	HORSESHOE	684.00	0.001023	58.45		310.20	203.48
WFD         27+AC.00         9E.55         33+53.96         98.84         102×102         HDRSES4DE         573.96         0.000500         58.45         015         215.80           MFD         0+00.00         98.84         13+72.00         99.53         1C2×102         HDRSESHDF         1372.00         0.000500         58.45         015         21b.80           MFD         13+72.00         79.53         100.53         22+70.00         100.97         97.99         HDRSESHDF         898.00         0.00034A9         45.51         015         153.30           WFD         22+70.00         100.53         22+70.00         101.49         93         CIRCULAR         1030.00         0.000500         47.17         015         162.70	10	MFD	26+90.00	96.51	27+80.00	98.55	3-54	SIPHON	110.00	0.000363	47.70	. 01 5	53.21	34.39
MFD         0+00.00         GR.45         13+72.00         99.53         1C2X102         HGRSESHOF         1372.00         0.000500         58.45.015         21b.80           WFD         13+72.00         79.52         13+72.00         100.53         22+70.00         100.97         97.89         HGRSESHOF         898.00         0.0003489         45.51         .015         153.30           WFD         22+70.00         100.697         97.89         93         CIRCULAR         1030.00         0.000509         47.17         .015         162.70	10	WFD.	27+86.00	96.55	33+53.96	98.84	102×102	HORSES40E	573.96	0.000500	58.45		215.80	143.11
WFD         13+72.00         190.53         ERDP MANHOLF           FD         13+72.00         100.53         22+70.00         100.97         93 X90         HDRSESHOF         898.00         0.0003489         45.51         1015         153.30           WFD         22+70.00         100.97         33+00.00         101.49         93         CIRCULAR         1030.00         0.0009500         47.17         015         162.70	80	MFD	0+00+0	48.85	13+72.00	69.53	1 C2×102	HORSESHOF	1372.00	0.000500	58.45	.015	215.80	140.11
WFD 13+72.00 100.53 22+70.00 100.97 93 X90 HDRSESHOF 898.00 0.000489 45.51 .015 153.30 WFD 22+70.0C 10C.97 33+00.00 101.49 93 CIRCULAR 1030.00 0.000509 47.17 .015 162.70	80	MFD	13+72.00	16.53	13+72.00	100.53		DROP MANHOLF						
MFD 22+70.0C 10C.97 33+00.00 101.49 93 CIRCULAR 1030.00 0.000500 47.17 .015 162.70	83	940	13+72.00	100.53	22+70.00	100.97	99 X 60	H025F540F	898.00	0.000489	45.51	\$10.	153.30	40.06
		MED	22+70.00	100.97	33+00.00	101.49	66	CIRCULAR	1030.00	0.000500	47.17		162.70	105.15

TABLE A-1 MCC INTERCEPTORS NORTH SYSTEM

	רננ	FROM	(FT)	TO STATION	INVERT (FT)	SI 2F (TN)	SHAPE	LENGTH (FT)	SLOPE	AREA (50= T)	2 7 7	CAPACITY (CFS) ()	(MGD)
Mark   Mark	4F.D	0+06-00	104.12	25+15.00	108.93	72 X 75	FXT. CIRCLE	2515.00	0.000322	29.17	910.	66.38	42.90
		25+15.00	138.93	26+44.83	109.00	50×63	EXT. CIRCLE	129.83	625000.0	20.89	910.	53.55	34.61
Hander	040	00.0000	165.00	36.496.00	110.48	56 X 63	FXT. CIPCLE	3696.00	0.000400	20.89	910.	.6.13	18.62
	MFD	03.00.0	102.24	3+00.00	102.45	78 X91	EXT. CIPCLE	300.00	0.1007.00	34.81	910.	120.50	17.88
WED         1         17.000.00 <td>MED</td> <td>30.03+6</td> <td>102.45</td> <td>3+00.00</td> <td>103.20</td> <td></td> <td>DRJP WANHOLF</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	MED	30.03+6	102.45	3+00.00	103.20		DRJP WANHOLF						
WFD         1         17.60.00         104.28         172.47         17.60.00         104.28         172.40         17.60.00	C L	00.05+0	107.20	17+00.00	104.17	7.2	CIRCULAP	1400.00	0.000689	28.27	910.	96.56	62.40
	K FO	17.00.00	104.17	18+65.00	104.28	72 X 75	EXT. CIPCLE	165.00	0.000666	29.77	910.	94.20	88.09
18.465.00         10.4.78         66.KKG         FXT. CIRCLE         3749.65         0.000689         25.13 .016         77*0           0.000.6.C         107.36         4.6.KKG         FXT. CIRCLE         373.49.65         0.000264         23.75 .016         44.43           22.770         107.37         4.0.43         4.6.KKG         FXT. CIRCLE         373.40         25.13 .016         95.29           34.34.C         112.61         34.34.C         0.000769         25.13 .016         95.29           34.34.C         112.61         34.34.C         0.000769         25.13 .016         95.29           34.34.C         112.67         34.34.C         0.000789         25.13 .016         95.29           34.34.C         112.67         44.71         66.KKG         FXT. CIRCLE         34.34.C         0.000789         25.13 .016         77.48           34.21.C         112.67         44.21         66.KKG         FXT. CIRCLE         44.21.C         25.13 .016         77.48           44.21.C         112.67         44.21.C         66.KKG         FXT. CIRCLE         44.21.C         25.13 .016         77.48           44.21.C         112.44         44.21.76         112.44         44.21.76         44.21.C	673	18+65.00	104.28	18+65.00	104.78		CEGP MANHOLE						
WED WIND         OFFORCE         107.36         224.70.00         167.90         Aff (CHCULAP)         2770.00         20.000264         23.75 .016         444.43           WED WIN         224.77.00         110.40         76.849         FXT. CIPCLE         3434.00         25.13 .016         95.29           WIN         344.34.00         113.61         66.869         FXT. CIPCLE         3434.00         25.13 .016         95.29           WIN         344.34.00         113.67         66.869         FXT. CIPCLE         3434.00         25.13 .016         95.29           WIN         344.34.00         113.67         66.869         FXT. CIPCLE         3434.00         25.13 .016         77.48           WIN         344.34.00         113.67         66.869         FXT. CIPCLE         3434.00         25.13 .016         77.48           WIN         444.21.00         117.11         66.869         FXT. CIPCLE         3421.00         77.48           WIN         444.21.00         117.11         66.869         FXT. CIPCLE         3421.00         77.48           WIN         444.21.00         117.11         444.21.00         118.48         50.853         FXT. CIPCLE         3421.00         77.48         77.48	RFS	18+65.00	104.78	56+14.65	107.36	66 x66	FXT. CIRCLE	3749.65	0.000689	25.13		77.40	50.05
WIN         22+77.n°         10.40         66x69         FXT. CIPCLE         2723.97         0.001042         25-13.016         95.29           WIN         0+050.c0         110.40         113.51         66x69         FXT. CIPCLE         343.60         0.000789         25-13.016         92.92           WIN         34+34.60         113.67         66x69         FXT. CIPCLE         236.00         0.000789         25-13.016         82.92           WIN         36+70.00         113.67         66x69         FXT. CIPCLE         236.00         0.000677         23.75.016         77.48           WIN         36+70.00         117.11         66x69         FXT. CIPCLE         421.00         177.43         77.48           WIN         44+21.00         117.11         66x69         FXT. CIPCLE         421.00         174.8         77.48           WIN         44+21.00         117.11         66x69         FXT. CIPCLE         1976.46         6.001790         14.68.016         60.76           WIN         44+21.00         118.40         50x53         FXT. CIPCLE         1976.46         6.001790         14.68.016         60.76           WIN         50x63         FXT. CIPCLE         1976.46         6.001790	MED FIN	0+00+0	107.36	22+70.00	167.96	99	CIRCULAP	22.07.05	0.000264	23.75	910.	44.43	28.71
	NIN GIN	22+70.00	197.96	40+03.97	110.80	66 X F G	EXT. CIPCLE	2723.97	0.001042	25.13	910.	95.29	61.58
	213	0.0000	116.80	34+34.00	113.51	69x 99	FXT. CIPCLE	3434.66	0.000789	25.13		82.92	53.59
	7 .	34+34.00	113.51	36 +70 -00	113.67	**	CIRCULAP	236.00	0.000677	23.76	910.	711.15	45.98
WIN         0+00.00         114.08         44+21.00         117.11         66 X69         EXT. CIPCLE         4421.00         0.000689         25.13.016         77.40           WIN         44+21.00         118.44         62+97.46         121.79         50 X53         f XT. CIPCLE         1876.46         6.001780         14.68.016         60.59           WIN         50 X53         f XT. CIPCLE         1876.46         6.001780         14.68.016         60.59           WIN         50 X53         f XT. CIPCLE         1876.46         6.001790         14.68.016         60.76           WIN SHW         38+70.00         126.74         50 X53         f XT. CIPCLE         1870.00         6.001790         14.68.016         60.76           WIN SHW         38+70.00         126.74         39+73.00         126.74         49+73.00         126.74         49+73.00         126.74         48-42.00         60.009709         14.68.016         52.00           WIN SHW         39+73.00         126.84         307*3.00         129*4         45+42.00         129*4         45+42.00         129*4         45*42.00         129*4         45*42.00         129*4         45*42.00         129*4         45*42.00         129*4         120*0         14*81 <td>21.4</td> <td>36+76.00</td> <td>113.67</td> <td>42+76.48</td> <td>114.09</td> <td>96×69</td> <td>EXT. CIRCLE</td> <td>94.009</td> <td>0.000689</td> <td>25.13</td> <td>910.</td> <td>77.48</td> <td>20.02</td>	21.4	36+76.00	113.67	42+76.48	114.09	96×69	EXT. CIRCLE	94.009	0.000689	25.13	910.	77.48	20.02
wIN         44+21.0C         118-14         44+21.0D         118-14         50 X53         FXT. CIPCLE         1876-46         0.001780         14.68.016         60.59           wIN         SHW         0+00.0C         121.79         30 X53         FXT. CIPCLF         3870-0         0.001790         14.68.016         60.76           wIN         SHW         39+70-0         121.79         30 X53         FXT. CIPCLF         3870-0         14.68.016         60.76           wIN         SHW         39+70-0         121.79         30 X57         CHAMBER         103.60         0.0009709           wIN         SHW         30+72-0         126.84         397+31.00         28-74         50 X57         FXT. CIPCLE         570-0         0.001842         14.68.016         60.76	713	00.00+0	114.08	44+21.00	117.11	66 x65	FXT. CIPCLE	4421.00	0.000669	25.13		77.40	50.05
#IN SHW 0+000.00 121.79 20+77.46 121.79 50×53 FXT. CIPCLE 1876.46 0.001780 14.68 .016 60.59  #IN SHW 0+000.00 121.79 20+70.00 128.74 50×53 FXT. CIPCLE 3870.00 0.001790 14.68 .016 60.59  #IN SHW 39+70.00 125.74 30+73.00 125.74 CHAMBER 103.00 0.001842 14.68 .016 62.00  #IN SHW 30+73.00 126.84 307.31.00 28.74 BY 50×53 FXT. CIPCLE 570.00 0.001842 14.68 .016 62.00	71.3	44+21.00	117.11	44+21.00	118.34		DEOP MANHOLE						
#IN SHW 0+00.0C 121.79 20+70.00 128.74 59.853 FXT. CIPCLF 3A70.00 6.001790 14.68 .016 60.76  FXT. CIPCLF 3A70.00 6.001790 14.68 .016 60.76  FXT. CIPCLF 3A70.00 6.001790 14.68 .016 60.76  FXT. CIPCLF 3A70.00 6.001790 14.68 .016 62.00	71.	44+21.00	118.44	62497.46	121.79	50 X 53	FXT. CIPCLE	1876.46	0.001780	14.68	910.	69.09	33.16
# 11 SHW 38+7C.OC 125.74 38+7C.OC 125.74 CHAMBER 103.CO 0.009709  # 14 SHW 38+70.00 125.84 39773.00 28.74 URDP MANHOLE  # 14 SHW 39+73.00 125.84 45+43.00 129.89 50X57 FXT. CIPCLE 570.CO 0.001842 14.68 .016 52.00	MIN SHE	0.00.00		384 70.00	128.74	59 X53	FXT. CIPCLF	38 70.00	0.001790	14.68	910.	92.09	39.27
#I'4 SHW 78+70.00 125.74 39+73.00 126.74 CHAMBER 103.00 0.009709	FIN SHM			30+76.00	125.74		CROP MANHOLF						
MIN SHM 39477.00 126.84 397431.00 28.74 URDP MANHOLE 570.00 0.001842 14.68 .016 62.00	MIN SHM		125.74	19473.00	126 .74		CHAMBER	103.00	0.009709				
MIN SHM 39477.00 12F.P4 45442.00 129.89 50X57 FXT. CIPCLE 570.00 0.001842 14.68 .016 62.00	PIN SHE		126.84	397+31.00	28.74		DROP MENIOLE						
	MHS NI .		125.84	00-23-55	129.89	50 X53	FXT. CIPCLE	570.00	0.001842	14.68	910.	95.00	10.01

TABLE A-1 MCC INTERCEPTORS NORTH SYSTEM

1154				STATION	(5.1)	213		(FT)		(50=1)	2	) (5=2)	( MGD )
	MON SHM	45+43.00 125.89	125.89	45+43.00	131.05		DROP MANHOLE						
1154	MHS NI	45+43-00 131-05	131.05	71+98.00	139.81	36	CIRCULAP	2655.00	0.00 3322	7.07	. 01 5	33.30	21.52
115A	NIN	71+98-00 139-87	139.87	71+98.00	148.33		DROP MANHOLE						
115A	MIN SHE	71+99.00	146.33	78445.82	150.50	36	CIRCULAR	647.82	0.303349	1.07	\$ 10.	33.52	21.66
1158	<b>31</b> S	78+45.82	150.50	84+44.00	152.50	*	CIRCU_AR	598.18	0.00 3343	7.07	• 01 5	33.40	21.59
1158	SHR	84+44.00	152.50	84+44.00	159.03		DRUP MANHOLE						
1158	SFR	84+44.00	155.03	90+42.00	168.85	3.6	CIRCULAR	59H.00	7.016421	7.07	• 10 •	74.22	47.97
1158	SHA	90+42.00	168.85	100+01	172.21	*	CIRCULAR	959.00	0.003503	7.07	. 015	34.20	22.10
1158	SHM	100+01-00	172.21	100+01-00	174.69		DECP MANHOLE						
1158	SHM	100+01.00	174.69	136+09.00	191.66	*	CI+CU_AB	3608.00	0.004703	7.07	910.	39.70	25.66
1158	NHS	136+09.00	191.66	136+09.00	197.02		DRCP MANHOLF						
1158	SHM	136+09.00	197.02	147+78.00	250.77	>	CIRCULAR	1129.00	0.003321	7.07	210. 70.7	32.30	21.23
207A	CAM	6+77.55	97.BO	6+92.55	03.45		TRANSITION	15.00					
2074	**	6+92.5	93.45	17+10.00	94.26	98x77.66	HORSESADE	1017.45	0.0000196	42.85	. 013	208.40	134.68
207A	440	17+10.00	94.26	23+85.00	94.76	98 X73 . CC	HORSESHOR	675.00	0.000000	42.85	.013	201.00	129.90
2078	1	23.85.00	94.76	27+80.00	50.30	94.177.4Q	POPSESHOR	195.00	0.000435	42.95	.013	213.50	137.98
2078	3	27+80.00	00.00	36+00.00	17.50	98X77.EC	HUASESHUE	920.00	0.0000756	42.85	.013	202.70	131.00
2078	CAM	36+00.00	17.50	30+76.41	95.00	124 844	HEASESHUE	236.41	0.0000719	39.00	.013	167.10	107.99
207R	3	38+36.41	95.86	45.00.00	06.34	134×60	HOPSESHOE	663.59	0.000753	39.00	.013	171.00	113.51
2078	CAN	45+00.00	96.38	47+ 45 . 00	07.00	124 840	HCASESAPE	265.00	0.002139	39.00	.013	301.40	194.79
2078	**	47+65.00	62.00	00-64+67	97.06	32 X 26	HORSESHOE	03.20	0.000631	39.07	.013	164.10	106.05
2078	CAN	48+60.00	97.06	. H . 75 . 1.	07.60	27.4.14	10H2 15EOH	774.83	96400000	10.07		25.	35

TABLE A-1 MCC INTERCEPTORS NORTH SYSTEM

2076 CAM 209 CAM	56+34-83 64+36-69 64+36-69 64-30-60 64-30-60 64-30-60 64-30-60 64-30-60 64-30-60 64-30-60 64-30 64-30 64-30 64-30 64-30 64-30 64-30 64-30 64-30 64-30 64-30	9 2 2 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	57+00.00								01.11	
	64 + 25 - 5 6 64	96.25		04.10	92×7C	HORSESHOF	65.17	6.002762	39.01	• 01 3	363630	221.87
	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	96.35	64+25.58	98.25	92×70	HORSESHOF	725.58	0.000647	39.07 .013	.013	166.10	107.35
	0+00-00	00.50	(4+39.5R	00.00		DEOP MANHOLE	14.00					
	0+00+0	00.20	64+89.58	40.66	9	CIRCU_AR	20.00	0.0000150	19.64 .013	.013	11.48	46.20
	1+75.00		00.00.00	46.56	04	CIRCULAP	90.00	***000000	19.64	. 01 3	55.00	35.55
	1+75.00	95.94	1+75.00	66.46	09	CISCULAP	95.00	0.3006.0	19.64	.013	63.90	41.30
		92.99	1+75.00	10.55		C POP MANHOLF						
	1+75.00	93.01	11+50.00	93.54	9	CIRCULAR	975.00	0.000543	19.64 .013	.013	63.82	39.31
	11+50.00	93.54	13+12-18	63.63	99	CIRCULAR	162.18	0.000554	19.64	.013	61.43	39.70
	13+12-16	93.63	19+26.00	93.94	60	CIRCULAR	613.82	0.000505	19.64 .01 3	• 01 3	58.50	37.87
	19+26.00	93.94	19426.00	94 .35		DROP MANHOLE						
	19+26-00	94.35	21+12.00	74.46	<b>\$</b>	CIPCU_AR	186.00	0.000645	15.90 .013	.013	53.00	32,31
	21+12.00	74.47	25+00.00	94.73	54	CIRCULAR	388.00	0.000670	15.90	.013	91.00	32.96
209 CAN	25+00•00	94.73	25+ 00• 00	11. 46		DROP MANHOLE						
209 CAM	25+00•00	94.77	31+16.00	95.13	54	CIRCULAR	616.00	0.0005P4	15.90	.013	.7.60	30.76
209 CAN	31+16.00	55.13	35+00•00	95.36	54	CIRCULAP	384.00	0.000598	15.90 .013	.013	01.84	31.09
209 CAN	35+00•00	95.36	35+00.00	96.54		DROP MANHOLE						
209 CAM	35+00•00	46.54	41+30.00	97.03	9,	CIRCULAR	630.00	0.000777	7.07	.013	18.60	12.02
209 CAN	+1+30.00	67.03	47+77.66	97.55	36	CI3CU_AP	647.66	0.000802	7.07	.013	19.90	12.21
209 CAN	47+77.66	97.55	47+77-66	98.05		DROP MANHOLE						
209 CAN	47+77.66	56.05	50+86.00	98.41	30	CIRCULAP	302.34	0.001100	16	.013	011	9.5
209 CAN	50+80.00	98.41	59+07.00	09.39	30	CIRCULAR	827.60	0.001185	16.4	£ 10 · 16 · 4	11.11	9.1.

TABLE A-1 MDC INTERCEPTORS NORTH SYSTEM

2044         GG         G	SECT	רפכ	FROM	(FT)	STATICN	INVERT (FT)	S17E (1N)	SHAPE	LENGTH (FT)	SLOPE	AREA (50°T)	ZZZ	CAPACITY (CFS) (P	(MGD)
CAM         REATOLLE         REATOLLE         REATOLLE         STATE CONTINUE         REATOLLE	**0	POS	80+95.45	96.99	81+27.48	86.91	108	CIRCULAR	32.03	0.000349	63.62	.013	234.10	151.29
CAN         Ministant         Feeta         66-70         67-70         CTGCULAR         554-52         0.000400         19-64         0.00040         19-64         0.00040         19-64         0.00040         19-64         0.00040         19-64         0.00040         19-64         0.00040         19-64         0.00040         19-64         0.00040         19-64         0.00040         19-64         0.00040         19-64         0.00040         19-64         0.00040         19-64         0.00040         19-64         0.00040         19-64         0.00040         19-64         0.00040         19-64         0.00040         19-64         0.00040	4.0	POS	81+27.46	86.91	0+81.35	88.42		CROP MANHOLE	8.00					
CAN         RATTOLIC BRANCO         RATTOLIC BRANCO         CREDID MANADOLE         CANDOLIC BRANCO	**0	CRC	81+35.46	F P. 4 2	86+90.00	88.80	09	CIRCULAR	554.52	0.000000	19.64	.013	59.45	39.40
CAM         CHACOLAR         CAHOLAR         C	**0	CAM	86+90.00	86.80	86+97.00	88.90		DEOP MANHOLE						
CAM         67+61.C         64-65         67+05.0         69-95         7-44MER 3         74-00         0.00204         66-27 .013         29-55.0           CAM         67+05.0         89-75         88-15.0         80-76         88-13.0         90-70         68-13.0         90-70         66-27 .013         29-55.0           CAM         88-15.0         92-02         88-13.0         92-02         88-13.0         92-02         88-13.0         92-02         66-27 .013         29-55.0         92-03.0         92-03	440	CAN	86+97.00	88.90	87+61.00	89.85	9	CIRCULAR	64.00	0.000781	19.64	.013	63.22	40.85
CAM         69415.0         69.04         68AT 136         HORSESHOF         20.00         0.000500         66.27 7.013         29.55.5           CAM         68AT 15.0         99.04         68AT 136         HORSESHOF         8.00         0.257500         66.27 7.013         29.55.5           CAM         92.20         92.40         92.02         98AT 136         HORSESHOF         8.00         0.257500         66.27 7.013         29.55.5           CAM         92.21         92.22         98AT 136         HORSESHOF         463.62         0.000500         66.27 7.013         295.50           CAM         92.21         92.22         92.25	**0	440	87+61.00	89.85	87+95.00	89.95		CHAMBER	34.00	0.002941				
CAM         BRA155.0         GA-237.0         GB-27.0	**0	CAM	87+95.00	89.95	88+15.00	96.68	88X138	HORSESHOF	20.00	0.000500	66.27		295.50	190.98
CAM         6000000         469.48 <td>**0</td> <td>CAN</td> <td>88+15.00</td> <td>90.08</td> <td>84+23.00</td> <td>92.02</td> <td>88X 1 36</td> <td>HORSESHUE</td> <td>8.00</td> <td>0.257500</td> <td>66.27</td> <td>• 01 3</td> <td></td> <td></td>	**0	CAN	88+15.00	90.08	84+23.00	92.02	88X 1 36	HORSESHUE	8.00	0.257500	66.27	• 01 3		
CAM         CHAMBE         Z1.50         CHAMBE         Z1.5	**0		88+23.00	92.02	92+91.82	92.25	88X 1 38	HD3SES40E	463.82	0.000500	66.27	.013	295.50	190.98
CAM         03+13-32         92-55         94+93.00         92-66         RAX10B         HD35ESHDF         179-68         0.000600         52.05 .013         169-90           CAM         0+18-5C         92-90         0-20-94         60         CIRCULAR         72         CIRCULAR         72-5C         0.000770         28-27 .013         125-60           CAM         19+04-97         RE-BR         19+17-34         RR-90         72         CIRCULAR         32-37         0.000770         28-27 .013         125-60           CAM         19+37-34         RR-90         72         CIRCULAR         32-37         0.000770         28-27 .013         125-60           CAM         19+37-34         RR-90         72         CIRCULAR         32-37         0.000770         28-27 .013         125-60           CAM         19+37-34         RR-90         19+70-34         RR-90         72         CIRCULAR         33-00         15-50         0.000770         28-27 .013         125-60           CRC         87+21-14         87-50         81+34-4R         RR-50         54         CIRCULAR         586-66         0.001800         15-90 .013         113-90           ROS         81+34-4R         RR-50         91-00			92+91.82	92.25	93+13-32	92.55		CHAMBER	21.50					
CAM         0+18-5C         02-00         0+68-5D         0-000-00         0-000-00         19-64 .013         55-41           CRC         81-35-4C         81-30         0-000-00         0-000-00         19-64 .013         15-60           CAM         19+04-97         8E-8B         19+37-34         8B-90         72         CIRCULAR         37-05         0-000770         2B-27 .013         125-60           CAM         19+37-34         8E-90         19+37-34         8B-91         72         CIRCULAR         33-00         2B-27 .013         125-60           CAM         19+37-34         8E-90         19+37-34         8B-91         72         CIRCULAR         33-00         2B-27 .013         125-60           CAM         87+10-64         87+21-14         87-50         8B-91         72         CIRCULAR         586-66         0-001800         15-00 .013         13-56           BOS         81+34-46         8B-50         98-04         54         CIRCULAR         586-66         0-001800         15-00 .013         13-90           BOS         81+34-46         8B-50         98-04         98-04         98-04         98-04         98-04         98-04         98-04         98-04         98-04	100	CAN	93+13.32	92.55	94+93.00	95.66	84×108	HORSESHOF	179.68	0.000600	52.05	.013	169.90	109.80
CAM         19+35-46         RE-8R         19+37-34         RR-RR         72         CIRCULAR         579-55         0.000770         28-27 .013         125-60           CAM         19+04-97         RE-8R         19+37-34         RR-90         72         CIRCULAR         32-37         0.000770         28-27 .013         125-60           CAM         19+37-34         RR-90         19+70-34         RR-90         72         CIRCULAR         32-37         0.000770         28-27 .013         125-60           CAM         R7+10-64         RR-90         19+70-34         RR-90         RR-91         RR-90         RR-90         RR-91         RR-90	**0	CAN	0+18.50	92.90	0+88.50	95.94	99	CIRCULAP	70.00	0.000600	19.64		55.41	35.91
CAM         19+04.97         RE.BB         19+37.34         AB.90         72         CIRCULAR         32.37         0.000770         28.27 .013         125.60           CAM         19+37.34         AB.90         19+70.34         AB.90         19+70.34         AB.90         CHAMPER         33.00         AB.50         AB.5	840	CRC	81+35.46	86.43	87+15.03	88.88	72	CIRCULAR	579.55	0.000010	28.27		125.60	81.17
CAM         19+37.34         RE.90         19+70.34         8B.91         CHAMBE?         33.00           CAM         87+21.14         87.50         DEOP MANHOLE         586.66         0.001800         15.90 .013         83.56           CRC         87+21.14         87.50         54         CIRCULAR         586.66         0.001800         15.90 .013         83.56           BDS         81+34.46         88.50         98.00         PR.00         PR.00         PR.00         143.33         0.003349         15.90 .013         113.90           BDS         0+07.75         98.04         36.04         36.04         36.04         36.04         36.04         36.01	840	CAN	19+04-97	86.88	19+37.34	88.90	72	CIRCULAR	32.37	0.000070	28.27		125.60	81.17
CAM         R7+10.64         B3.60         R7+21.14         R7-50         B7-51.14         R7-50         B7-51.14         R7-51.14         R7-50         B7-51.14         R7-50         R1-34.4A         R8-50         S4         CIRCULAR         S86.66         0.001800         15.90         0.013         B3.56           BOS         R1+34.4A         R8-50         S9.00         S9.00         PR.00         PR	940	CAM	19+37.34	86.90	19+70.34	16.88		CHAMBER	33.00					
CRC         87+21.14         87.50         81+34.48         88.50         54         CIRCULAR         586.66         0.001800         15.90 .013         83.56           BOS         81+34.4E         82.50         81+34.4E         82.50         81.34.4E         82.00         81.34.4E         83.56         83.33         83.56         83.56         83.56         83.56         83.56         83.56         83.56         83.	840	CAM	87+10.64	83.60	87+21.14	87.50		DEOP MANHOLE						
BOS         RI+34.4E         ER.50         RI+40.5B         98.00         DPOP MANHOLE           FOS         0+07.75         98.04         98.4B         54         CIRCULAR         143.33         0.003349         15.90 .013         113.90           BOS         0+07.75         98.04         30         CIRCULAR         143.33         0.003349         4.91         013         23.65           WOB MFD         3+32.07         113.00         61+46.11         119.06         26xze         Ext. CIRCLE         5814.11         0.001042         4.05 .016         8.33	200	CRC	87+21.14	87.50	81+34.48	88.50	54	CIRCULAR	586.66	0.001800	15.90	• 01 3	83.56	54.00
FGS	300	808	81+34.48	68.50	81+40.58	98.00		DROP MANHOLE						
BOS 0+07.75 86.82 0+07.75 98.04 CROP MANHOLE  BOS 0+07.75 96.04 1+51.08 98.48 30 CIRCULAR 143.33 0.003349 4.91 .013 23.65  WOB MFD 3+32.00 113.00 61+46.11 119.06 26x2e Ext. CIRCLE 5814.11 0.001042 4.05 .016 8.33	200	ROS	0+07.75	98.00	1+51.08	98.48	54	CIRCULAR	143.33	0.003349	15.90	. 013	113.90	73.61
BDS	000	808	0+07.75	86.82	0+07.75	98.04		DROP MANHOLE						
WOB MFD 3+32.00 113.00 61+46.11 119.06 26X28 EXT. CIRCLE 5814.11 0.301042 4.05 .016 8.33	0.0	808	0+07.75	90.96	1+51.08	98.48	30	CIRCULAR	143.33	0.003349	4.91		23.65	15.28
	s,	WOB MFD				119.06	26 X2B	EXT. CIPCLE	5814.11	0.301042	4.05		8.33	5.38

TABLE A-1 MDC INTERCEPTORS NORTH SYSTEM

WIND	SFCT	700	STATION	TAVER T	STATION	INVERT (FT)	SIZE	SHAPE	(FT)	3-0-5	( SOF T)	2 2 2	CAPACITY (CF S) (	( MGD)
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,		NOS NED		115.06	61.46.11	123.94		DEOP MANHOLF						
WOR WITO         117772-01         120-34         179-34         179-34         179-34         179-34         179-34         179-34         179-34         179-34         179-34-78 <th< td=""><td>s</td><td>MOR MFD</td><td></td><td>123.94</td><td>117+72.91</td><td>128.34</td><td>26 x 28</td><td>FXT. CIPCLE</td><td>5626.41</td><td>0.000782</td><td>4.05 .0</td><td>91</td><td>7.21</td><td>4.66</td></th<>	s	MOR MFD		123.94	117+72.91	128.34	26 x 28	FXT. CIPCLE	5626.41	0.000782	4.05 .0	91	7.21	4.66
WORN WITHOUT NEW   19411-25   144-76   147-51   15   115   CIRCULAR   1475-47   147-51   14-11-25   144-26   15   CIRCULAR   1475-47   147-51   17-11-25   144-26   15   CIRCULAR   1475-47   14-11-25   14-26   14-	s	408 MFD		126.34	117+72.91	129.34		DROP MANHOLF						
WICH WICH   194111-25   144.26   19411-25   144.26   15   CIRCULAR   1676.47   0.009405   1.23 .015   1.23 .015   1.24 .016	0	BOR MFD	0.00.00	125.34	2+34.78	147.51	16	CIRCU.AR	234.78	0.077391			5.50	13.08
CAN ARE   0+43.40   104.12   124.26   29477.25   172.18   115   CHANEED   20.00   0.008405   1.23 .015   1.23 .0	s	NOS MED	2+34.78	147.51		164.26	15	CIRCULAR	1675.47	166600.0		5 1	2.60	3.62
CAME ARI         CHARMER         COMODES         CRANTER         CHARMER         20.00           SOW MED         CASSOLO         104.76         24.50.00         104.65         24.50.00         104.65         114.50         12.57.015           SOW MED         24.50.0         104.66         24.55.00         104.56         24.55.00         104.55         24.50.00         104.67         24.50.00         12.57.015           SOW MED         34.65.00         104.66         24.55.00         102.46         24.50.00         102.32         12.57.015           SOW MED         34.65.00         104.56         24.56.00         107.46         48         CHROLLAP         495.00         12.57.015           SOW MED         28.56.00         102.46         24.56.00         101.53         48         CHROLLAP         415.00         0.00043         12.57.015           SOW MED         28.56.00         101.67         24.50.00         101.69         66         CHROLLAP         415.00         0.00043         23.76.015           SOW MED         33.46.00         101.69         96.93         66         CHROLLAP         415.00         0.00040         23.76.015           SOW MED         33.46.00         96.63         96.93 <td></td> <td>NOB MFD</td> <td>19+111-25</td> <td>164.26</td> <td>28+17-25</td> <td>172.38</td> <td>15</td> <td>CIRCULAR</td> <td>966.00</td> <td>0.008405</td> <td>1.23 .0</td> <td>51</td> <td>5.14</td> <td>3.32</td>		NOB MFD	19+111-25	164.26	28+17-25	172.38	15	CIRCULAR	966.00	0.008405	1.23 .0	51	5.14	3.32
50M MFD         3445.0         104.76         2456.0         104.62         4P         CIRCULAR         207.0         0.000531         12.57 .015           50M MFD         3445.0         104.62         3445.0         104.56         4B         SIPHON         95.00         0.000531         12.57 .015           50M MFD         3445.0         104.62         3445.0         104.56         26431.0         0.00332         12.57 .015           50M MFD         3445.0         104.50         0.6531         2445.0         101.53         4FDUCE3         144.0         0.00332         12.57 .015           50M MFD         2445.0         101.53         2445.0         101.53         2445.0         101.54         2491.0         2400.0         12.57 .015           50M MFD         2445.0         101.6         2445.0         101.6         2445.0         101.0         2445.0 <td>U</td> <td>CAN ARL</td> <td>0+23.00</td> <td>104.76</td> <td>00+43.00</td> <td>104.76</td> <td></td> <td>CHAMBER</td> <td>20.00</td> <td></td> <td></td> <td></td> <td></td> <td></td>	U	CAN ARL	0+23.00	104.76	00+43.00	104.76		CHAMBER	20.00					
50M MFD         2+56.00         104.62         3+45.00         104.56         48         SIPHON         95.00         0.000631         12.57         015           50M MFD         3+45.00         104.56         249.50         045.51         48         CIRCULAP         2491.00         0.003232         12.57         015           50M MFD         28+56.00         102.96         101.53         6         CIRCULAP         415.00         0.000433         23.75         015           50M MFD         28+56.00         101.63         7         PEDUCES         144.00         0.00043         23.75         015           50M MFD         28+56.00         101.64         101.63         6         CIRCULAP         415.00         0.00043         23.75         015           50M MFD         33+65.0C         101.18         33+65.00         101.09         6.6         CIRCULAP         415.00         0.000493         23.75         015           50M MFD         33+65.0C         101.09         99.22         6.6         CIRCULAP         255.00         0.001074         23.75         015           50M MFD         33+65.0C         101.09         99.22         6.6         CIRCULAP         2615.00         0.000	_	SON MFD	0.643.00	104.76	2+50.00	104.62	4 4	CIRCULAR	207.00	0.000676			2.43	20.95
50M MFD         3446.00         104.56         28436.00         46.51         48         CIRCULAP         2491.00         0.003232         12.57 .015           50M MFD         28456.00         96.51         28456.00         102.96         101.53         101.53         101.53         101.50	U	SOM MFD	2+50.00	104.62	3+45.00	104.56	8	NOHOIS	95.00	0.000631			10.04	10.75
SOM WFD         28+36+06         96+51         28+56+06         102-96         102-96         102-96         14+00         14+00           SOW WFD         28+56+07         101-53         32+65+07         101-53         415-00         0.000843         23+76-015           SOW WFD         28+56+07         101-18         66         CIFCU_AP         415-00         0.000463         23+76-015           SOW WFD         33+65+07         101-18         33+65-07         101-09         66         CIFCU_AP         415-00         0.0004750         23+76-015           SOW WFD         33+65-07         101-18         33+65-00         101-09         66         CIFCU_AP         1955-00         0.0004750         23+76-015           SOW WFD         33+65-07         99-22         66         CIRCU_AP         2615-07         0.0004074         23+76-015           SOW WFD         109+10-00         96-63         109-22         66         CIRCU_AP         2722-00         0.000991         23+76-015           SOW WFD         110+80-00         93-96         117-50-00         93-96         117-50-00         90-00         23-76-00         90-00         90-00         90-00         90-00         90-00         90-00         90-00	U	SOM MFD	3+45.00	104.56	28+36.00	15.90	4	CIRCULAP	2491.00	0.003232			0.92	45.83
SQM MFD         28+50.07         102.96         28+50.00         101.53         0R3P MANHOLE         415.00         0.000843         23.76 .015           SQM MFD         28+50.00         101.63         32+65.00         101.18         32+65.00         101.09         66         CIRCULAR         120.00         0.000750         23.76 .015           SCM MFD         33+65.0C         101.09         98-99         66         CIRCULAR         1955.00         0.001074         23.76 .015           SCM MFD         53+40.00         99-22         67         SIPHON         233.60         0.001074         23.76 .015           SOM MFD         81+88.00         96-63         109+10.00         96-63         66         CIRCULAR         2722.00         0.000991         23.76 .015           SOM MFD         81+88.00         96-63         109+10.00         93-96         66         CIRCULAR         2722.00         0.000991         23.76 .015           SOM MFD         110+80.0C         93-96         102-50         66.FM         CIRCULAR         670.00         2000990         23.75 .015           SOM MFD         110+80.0C         93-96         102-50         102-50         0.000991         23-75 .015           SOM MFD	·	SOM MFD	28+36.00	15.36	28+50.00	102.96		REDUCES	14.00					
SOW MFD         28+50.0C         101.57         32+65.0C         101.18         33+65.00         101.18         33+65.00         101.18         33+65.00         101.09         66         CIFCU_AP         415.00         0.0000750         23.76         .015           SOW MFD         33+65.0C         101.18         33+67.00         90.22         66         CIRCU_AR         120.00         0.0001074         23.76         .015           SOW MFD         53+60.00         96.63         66         CIRCU_AR         233.00         0.0001074         23.76         .015           SOW MFD         55+72.00         99.22         81+8P.00         96.63         66         CIRCU_AR         2722.00         0.000990         23.76         .015           SOW MFD         109+10.00         92.95         117+50.00         93.96         66         CIRCU_AR         2722.00         0.000990         23.76         .015           SOW WFD         110+80.00         92.96         117+50.00         93.96         102.50         0.000990         23.75         .015           SOW WFD         117+50.00         92.96         117+50.00         102.50         102.10         102.10         102.10         102.10         102.10         102.10	U	SOM MFD	29+50.00	102.96	28+50.30	101.53		DROP MENHOLF						
SOW MFD         33+85.0C         101.18         33+85.00         101.09         66         CIRCULAR         120.00         0.0000750         23.76         .015           SOW MFD         33+85.0C         101.09         53+40.00         99.22         66         CIRCULAR         1955.00         0.001074         23.76         .015           SOW MFD         53+40.00         99.22         81+88.00         99.22         66         CIRCULAR         2615.00         0.000990         23.76         .015           SOW MFD         81+88.00         96.63         109+10.00         93.96         66         CIRCULAR         2722.00         0.000990         23.76         .015           SOW MFD         110+80.00         92.97         110+80.00         93.96         PUMP STATION         170.00         23.75         .015           SOW MFD         117+50.00         93.96         102.50         102.50         102.50         23.75         .015           SOM MFD         117+50.00         93.96         102.50         102.50         102.10         23.75         .015           SOM MFD         117+50.00         102.50         102.10         102.10         102.10         102.00         102.10         102.00 <t< td=""><td>U</td><td>SON MFD</td><td>28+50.00</td><td>101.53</td><td>32+65.00</td><td>101.18</td><td>99</td><td>CIPCU_AP</td><td>415.00</td><td>0.000843</td><td>23.76 .0</td><td></td><td>84.50</td><td>54.68</td></t<>	U	SON MFD	28+50.00	101.53	32+65.00	101.18	99	CIPCU_AP	415.00	0.000843	23.76 .0		84.50	54.68
SOW MFD         33+85.0C         101.09         53+40.00         96.99         66         CTRCU_AR         1955.00         0.001074         23.76         .015           SOM MFD         53+40.00         56.63         66         CTRCULAR         2615.00         0.000990         23.76         .015           SOM MFD         81+88.00         96.63         66         CTRCULAR         2615.00         0.000990         23.76         .015           SOM MFD         109+10.00         92.94         110+80.00         93.96         66         CTRCULAR         2722.00         0.000991         23.76         .015           SOM MFD         110+80.00         92.94         110+80.00         92.94         110+80.00         66.FM         CTRCULAR         570.00         23.75         .015           SOM WFD         117+50.00         102.50         102.50         102.50         102.50         102.00	U	SOM MED	32+65.00	101.18	33+85.00	101.09	66	NOHOIS	129.00	0.0000.0	23.76 .0		1.80	27.01
SDM MFD         53+40-30         58+73-00         99-22         66         CIRCULAR         233-60         23.76 -015           SOM MFD         81+68-00         96-63         66         CIRCULAR         2722-00         0.000990         23.76 -015           SOM MFD         109+10-00         96-63         109+10-00         93-96         133-96         107-00         170-00         23.75 -015           SOM MFD         117+50-00         93-96         117+50-00         102-50         102-50         102-10         66-FM         CIRCULAR         570-00         23.75 -015           SOM MFD         117+50-00         102-50         102-50         102-10         66-FM         CIRCULAR         570-00         23.75 -015           SOM MFD         117+50-00         102-50         102-10         66-FM         CIRCULAR         1375-00         0.000291         23.76 -015           SOM MFD         117+50-00         102-50         102-10         66-FM         CIRCULAR         1375-00         0.000291         23.76 -015	U	SON MFD	33+85.00	101.09	53+40.00	96.99	9	CIRCULAR	1955.00	0.001074			65.6	61.78
SOM MFD         65+72.00         99.22         81+8P.00         96.63         Ef         CIRCULAR         2615.00         0.000990         23.76.015           SOM MFD         81+68.00         96.63         109410.00         93.96         66         CIRCULAR         2722.00         0.000991         23.76.015           SOM MFD         109410.00         93.96         117450.00         102.50         102.50         102.50         102.50         102.50         102.50         23.75.00         23.75.015           SOM MFD         117450.00         102.50         131+25.00         102.10         102.00         102.00         102.00         102.00         102.00         102.00         102.00         102.00         102.00         102.00         102.00         102.00         102.00         102.00         102.00         102.00         102.00         102.00         102.00	·	SOM MFD	53+40.90		55+ 73.00	99.22	*	SIPHON	233.60		23.76 .0		56.38	35.44
SOM MFD         81+68.00         96-63         109+10.00         93.96         66         CIRCULAR         2722.00         0.000981         23.76         .015           SOM MFD         110+80.00         93.96         66.FM         CIRCULAR         570.00         23.75         .015           SOM MFD         117+50.00         102.50         131+25.00         102.10         102.10         102.10         131+35.00         102.10         102.10         131+35.00         102.10         131+35.00         102.10         131+35.00         102.10         131+35.00         102.10         102.00	·	SOM MFD	55+72.00	99.22	81+88.00	96.63	**	CIRCULAR	2615.00	066000.0			82.11	59.32
SOM MFD         109+10.00         92.9F         110+80.0C         93.9F         110+80.0C         93.9F         110+80.0C         93.9F         117+50.0C         102.50         102.50         102-50         102-50         102-50         102-10         6F         CIRCULAR         1375.CO         0.000291         23.75         015           SOM MFD         131+25.0C         102-10         131+35.00         102-10         6F         CIRCULAR         1375.CO         0.000291         23.75         015	U	SOM MFD	81+68.00	96.63	100+10.00	93.96	99	C IRCU_AR	2722.00	0.000981	23.76 .0		91.36	59.04
SOM MFD 117+50.00 102-50 102-50 66.FM CTPCULAR 670.CO 23.75 .015 SOM MFD 117+50.00 102-50 131+25.00 102-10 6f CTRCULAR 1375.CO 0.000291 23.76 .015 SOM MFD 131+25.00 102-10 131+35.00 102-10 6f CTRCULAR 10.00 19.64 .015	U	SON MFD		92.94	110+80.00	93.96		PUMP STATION	170.00					
SOM MFD 117+50.00 102.50 131+25.00 102.10 6f CIRCULAP 1375.C0 0.000291 23.76 .015	U	SOM MED		93.96	117+50.00	102.50	66.FM	CISCULAR	670.00		23.75 .0	1.5		
SOM MFD 131+25.00 102+10 131+35.00 102+10 60 CIRCULAR 10.00	u	SOM MFD		102.50	131+25.00	102.10	96	CIRCULAR	1375.00	0.0000991			92.6	32.16
	u	SOM MFD		102.10	131+35.00	102.10	fc	CIRCULAR	10.00		19.64 .0	51		

TABLE A-1 MDC INTERCEPTORS NORTH SYSTEM

SAME         CAME         131435.0         103140.0         101775         60         SIPHON         205.0         0.001765         23.75.0         107.0           SAME         SAME         131435.0         100.61         66         CIRCULAR         835.0         0.00185         23.75.0         107.0           SAME         CAM         2004.0FD         131435.0         100.61         3.6         CIRCULAR         325.0         0.001053         7.07.015         17.77           RAME         CAM         2004.0FD         100.60         192.60         100.60         100.60         17.0         100.60         17.77           RAME         CAM         2004.0FD         100.60         192.60         100.60         200.00         100.60         17.0         100.60         17.0	SECT	707	STATION	INVERT (FT)	STATION	INVERT (FT)	SIZE (IN)	SHAPE	(FT)	S.03E	(S0=T)	Z Z Z	CAPACITY (C=S) (	(MGD)
Column   C	90	SOM MFD		102.10		101.75	9	NDHdIS	205.00	0.001707	19.64	5 10 •	57.49	37.15
Column   C	58	SON MFD		101.75		100.61	99	CIRCULAR	835.00	0.001365	23.76	• 10 •	107.701	69.60
CLR CALA         CLR CALAR         3265-60.0         0.001093         7.07 .015         1           F BLM CAM         Oxeocon         106.20         3755-0         105.20         40         CTR CALAR         325.00         0.002892         12.57 .015         0           R BLM CAM         0xeocon         106.20         3755-0         100.00         100.00         0.002892         12.57 .015         0           MAL         0xeocon         100.00         100.00         100.00         100.00         0.001890         3.14 .015         2           MAL         0xeocon         100.00         100.00         100.00         100.00         100.00         1.23 .013         2           MAL         0xeocon         100.00         100.00         100.00         100.00         100.00         1.23 .013         3.14 .015         2           MAL         0xeocon         100.00         100.00         100.00         100.00         1.23 .013         3.14 .015         2           MAL         0xeocon         100.00         100.00         100.00         100.00         1.00.00         1.123 .013         1.14 .013           MAL         0xeocon         100.00         100.00         100.00         100.00 <td>96</td> <td>BLM CAM</td> <td>200+87.00</td> <td>106.76</td> <td></td> <td>106.61</td> <td>36</td> <td>SIPHON</td> <td>141.00</td> <td>0.001063</td> <td>7.07</td> <td>• 01 5</td> <td>17.72</td> <td>11.45</td>	96	BLM CAM	200+87.00	106.76		106.61	36	SIPHON	141.00	0.001063	7.07	• 01 5	17.72	11.45
R. M. CAM   0.000.00   106.20   3.25.00   100.00   100.00   100.00   100.00   100.00   100.00   100.00   100.00   100.00   11.23   101.00   100.00   100.00   100.00   11.23   101.00   11.23   101.00   11.23   101.00   11.23   101.00   11.23   101.00   11.23   101.00   11.23   101.00   100	8	BLM CAM	202+28.00	106.61		103.02	36	CIRCULAR	3285.00	0.001093	7.07	5 10 •	19.12	12.36
E MA         SAPESCO         IOSCOR         TORODO         MANHOLE         CIRCULAR         CISCULAR         CASCOR         3.14 * 0.015         2.14 * 0.015         <	AVE		00.00+0	106.20		105.26	48	CIRCULAR	325.00	0.002892	12.57	• 01 5	67.08	43.35
MAL   0+60.00   0+62.00   106.03   0+62.00   106.31   15   CIRCULAR   62.00   0+016500   3+14 + 015   1   1   1   1   1   1   1   1   1	AVE		3+25.00	105.26		100.00		DROP MANHOLE						
WAL         0+662+06         106-31         15         CIRCULAR         62.00         0+001290         1+23 +013           WAL         0+622-06         106-31         0+62-00         106-11         15         CIRCULAR         62.00         0+001290         1+23 +013           WAL         0+622-00         106-31         10-62-00         106-11         1729-00         106-11         15         16         1729-00         16-11         1729-00         10-62-00         16-11         1729-00         10-62-00         16-11         1729-00         16-11         1729-00         16-11         1729-00 <t< td=""><td>AVE</td><td>BLN CAM</td><td>000000</td><td>101.00</td><td></td><td>102.65</td><td>24</td><td>CIPCULAR</td><td>100.00</td><td>0.016500</td><td>3.14</td><td>• 01 5</td><td>25.22</td><td>16.30</td></t<>	AVE	BLN CAM	000000	101.00		102.65	24	CIPCULAR	100.00	0.016500	3.14	• 01 5	25.22	16.30
MAL         OFECTOR         106-21.0         OFECTOR         Infector         CIRCULAR         LEGTON         OFECTOR         1.23 - 013           MAL         OFECTOR         107-50         177-29-00         109-65         16         11         CIRCULAR         1567-00         0.002004         1.23 - 013           MAL         327-27         102-86         34-7-27         102-86         24         CIRCULAR         327-27         0.001100         3-14 - 013           MAL         3427-27         102-86         34-27-27         105-45         7-84         7-84         7-84-17	HSF	*	00.00+0	106.03		106.31	15	CIRCULAR	62.00	0.001290	1.23	• 013	2.32	1.50
MAL         3+27.27         102.46         155         CIRCULAR         1667.00         0.002004         1.23 .013           MAL         3+27.27         102.46         24         CIRCULAR         327.27         0.001100         3.14 .013           MAL         3+27.27         102.46         3+27.27         102.46         24         CIRCULAR         327.27         0.001100         3.14 .013           MAL         3+27.27         102.46         3+27.27         105.45         7.68.41         106.11         1P         CIRCULAR         327.27         0.001100         3.14 .013           MAL         3+27.27         105.45         7.68.41         106.11         1P         CIRCULAR         327.27         0.00110         3.14 .013           MAL         3+27.27         105.46         7.68.43         66         CIPCULAR         461.56         0.000206         23.76         0.16           MOS         BPI         400.000         98.43         66         CIPCULAR         461.56         0.00040         17.79         0.16           MOS         BPI         400.000         98.43         66         CIPCULAR         461.56         0.00040         17.79         0.16           MOS	BSE	1	0+62.00	106.31	0+62.00	106.11		DROP MANHOLE						
MAL         3427.27         102.86         24         CIRCULAR         327.27         0.001100         3.14 .013           MAL         3427.27         102.86         3427.27         105.45         105.45         105.11         18         CIRCULAR         461.54         0.001100         3.14 .013           MAL         3427.27         102.86         3727.27         105.45         106.11         18         CIRCULAR         461.54         0.001430         1.77 .013           ROX         11+52.00         96.51         37401.22         97.24         5PECIAL         2549.22         0.000286         23.76 .016         3           ROS         RO         96.51         37401.22         98.43         66         CIPCULAR         2549.22         0.000286         23.76 .016         3           ROS         RO         0.000.00         98.44         40+05.50         100.00         58 x 63         GOTHIC         142.50         0.000410         17.90 .016         3           ROS         RO         41+46.00         100.10         54 x 63         GOTHIC         142.50         0.000410         17.90 .016         3           ROS         RO         41+46.00         100.10         41+46.00         10	H SE	1	0+62.00	106.11		109.65	- <del>1</del>	CIRCULAR	1667.00	0.002004	1.23	10.	5.89	1.87
MAL         3+27.27         102.46         3+27.27         105.45         105.45         105.45         1070 MANHOLE           MAL         3+27.27         105.46         7+88.81         106.11         18         CIRCULAR         461.54         0.301430         1.77         1013           ROX         11+52.00         96.51         37+01.22         97.24         SPECIAL         2549.22         0.000286         23.76         1.77         1013           ROS         RPD         0+00.00         98.43         66         CIPCULAR         2961.22         0.000400         23.76         1016           BOS         BPI         0+00.00         98.44         40+05.50         100.00         5AX63         GOTHIC         4005.50         0.000410         17.90         116           ROS         BRI         41+48.00         100.10         5AX63         GOTHIC         142.00         17.90         17.90         116           ROS         BRI         41+48.00         100.10         5AX63         GOTHIC         15.00         0.000410         17.90         17.90         17.90           ROS         PRI         41+75.0C         100.10         41+75.00         100.10         5AX63         GOTHIC	38	14.	00.0000	102.50		102.86	54	CIRCULAR	327.27	0.001100	3.14	• 01 3	7.50	4 . 85
3427.27         105.45         7488.81         106.11         1P         CIRCULAR         461.54         0.0001430         1.77 .013           FRO         0400.00         96.51         37401.22         97.24         SPECIAL         2549.22         0.000286         23.76           FRO         0400.00         96.51         37401.22         98.43         66         CIHCULAP         2961.22         0.000286         23.76         .016           BRI         0400.00         98.44         40405.50         100.04         58X63         GOTHIC         142.50         0.000399         19.63 .016           BRI         41448.0C         100.10         41+46.00         100.10         54X63         GOTHIC         142.50         0.000410         17.90 .016           PRI         41+66.00         100.10         41+75.00         100.11         54X63         GOTHIC         15.00         0.000410         17.90 .016           PRI         41+66.00         100.11         43443.00         100.11         54X63         GOTHIC         15.00         0.000410         17.90 .016           PRI         41+75.00         100.11         43443.00         100.27         54X63         GOTHIC         241.60         0.000372	BSW	# K	3+27.27	102.86		105.45		CROP MANHOLF						
FOX         11+52.00         96.51         37+01.22         97.24         SPECIAL         2549.22         0.000286         23.76         .016           FOS         FRO         11+52.00         96.51         37+01.22         98.43         66         CIPCULAP         2961.22         0.000400         23.76         .016           BOS         BRI         40+06.55         100.04         58×63         GOTHIC         4005.50         0.000399         19.63         .016           BOS         BRI         41+48.0C         100.10         41+48.00         100.10         54×63         GOTHIC         142.50         0.000411         17.90         .016           BOS         BRI         41+60.00         100.10         41+75.00         100.11         54×63         GOTHIC         15.00         0.000416         17.90         .016           FOS         PRIS         FPI         41+75.00         100.11         54×63         GOTHIC         15.00         0.000416         17.90         .016           FOS         PRIS         PRIS         PRIS         41+75.00         100.11         54×63         GOTHIC         241.60         0.000416         17.90         .016           FOS         PRIS	as:	14	3+27.27	105.45		106.11	18	CIRCULAR	461.54	0.301430	1.17		3.97	2.57
FOS FIRD         0+000.00         57.24         29+61.22         98-43         66         CTHCULAP         2961.22         0.0000400         23.76         .016           BOS BRI         0+000.00         98.44         40+05-50         100.00         54 X63         GOTHIC         4005-50         0.000399         19-63         .016           BOS BRI         41+48.0C         100.10         41+48.00         100.10         54 X63         GOTHIC         142.50         0.000410         17.90         .016           BOS BRI         41+48.0C         100.10         41+75.00         100.11         54 X63         GOTHIC         168.00         0.000400         17.90         .016           BOS BRI         41+75.CC         100.11         43+43.00         100.11         54 X63         GOTHIC         168.00         0.000410         17.90         .016           BOS BRI         41+75.CC         100.11         43+43.00         100.12         54 X63         GOTHIC         241.40         0.000410         19.63         .016           BOS BRI         43+43.00         100.27         44+11.60         100.27         54 X63         GOTHIC         27.00         0.000372         17.90         .016		ROX	11+52.00	1 5. 96	•	97.24		SPECTAL	2549.22	0.000286	23.76		*6.24	29.88
BOS BRI         40+05-5C         100.04         58X63         GOTHIC         4005-5C         0.000399         19-63 .016           BOS BRI         40+05-5C         100.10         54X63         GOTHIC         142.50         0.000411         17.90 .016           BOS BRI         41+46-0C         100.10         54X63         GOTHIC         12.00         17.90 .016           BOS BRI         41+46-0C         100.11         54X63         GOTHIC         15.00         0.000400         17.90 .016           BOS BRI         41+75-CC         100.11         43+43.00         100.18         54X63         GOTHIC         168.00         0.000416         19.63 .016           BOS BRI         41+75-CC         100.11         43+43.00         100.27         54X63         GOTHIC         241.60         0.000372         17.90 .016           BOS BRI         45+84.60         100.27         54X63         GOTHIC         27.00         0.000372         17.90 .016		POS PPO	0.00.00	42.12	29+61.22	98.43	99	CIPCULAP	2961.22	0.000400	23.76	910.	54.69	35.34
BGS BRI         40+05-5C         1CC.04         41+4F.00         100-10         54 X63         COTHIC         142.50         0.000411         17.90         .016           BGS BRI         41+4F.0C         1CO.10         41+75.00         100-11         54 X63         GOTHIC         15.C0         0.000400         17.90         .016           BGS BRI         41+75.CC         100-11         43+43.00         100-18         58 X63         GOTHIC         168.00         0.000416         17.90         .016           BGS BRI         43+43.00         100-12         45+84.60         100-27         54 X63         GOTHIC         241.60         0.000372         17.90         .016           BGS BRI         45+84.60         100-27         54 X63         GOTHIC         27.00         0.000372         17.90         .016		BOS BP1	0.00.00	98.44		100.04	58 X 63	G0THIC	4005.50	0.000399	19.63	10.	42.41	27.41
ROS BRI         41+48.0C         1C0.10         41+60.00         100.10         54×63         GOTHIC         15.00         0.000400         17.90         .016           ROS BRI         41+75.CC         100.11         43+43.00         100.18         54×63         GOTHIC         168.00         0.000400         17.90         .016           ROS BRI         43+43.00         100.18         45+84.60         100.27         54×63         GOTHIC         241.60         0.000372         17.90         .016           BOS BRI         45+84.60         100.27         54×63         GOTHIC         27.00         0.000372         17.90         .016		BCS BRI	40+05.50	100.001		100.10	54 X 63	GOTHIC	142.50	0.000411	17.90	• 01 0	37.92	24.51
BOS BRI         41+60.00         100.10         41+75.00         100.11         54×63         GOTHIC         15.00         0.000400         17.90         .016           HOS PRI         41+75.00         100.11         43+43.00         100.12         58×63         GOTHIC         168.00         0.000416         19.63         .016           HOS PRI         43+43.00         100.27         54×63         GOTHIC         241.60         0.000372         17.90         .016           HOS BRI         45+84.60         100.27         46+11.60         100.28         58×63         GOTHIC         27.00         0.000370         19.63         .016		ROS BRI	41+48.00	100.10		100.10		CHAMBER	12.00					
#05 PPI 41+75.CC 100.11 43+43.00 100.18 58X63 GOTHIC 168.00 0.000416 19.63 .016 #05 PRI 43+43.00 100.1E 45+84.60 100.27 54X63 GOTHIC 241.60 0.000372 17.90 .016 #05 BRI 45+84.60 100.27 46411.60 100.28 58X63 GOTHIC 27.00 0.000370 19.63 .016		805 BR I	*1.60.00	100.10		10001	54 x 63	GOTHIC	15.00	0.000000	17.90	9 10 .	37.92	24.51
POS PRI 43+43.00 100.18 45+84.60 100.27 54X63 GOTHIC 241.60 0.000372 17.90 .016		BOS PP I	41+75.00	10001		100.18	58×63	SDT H 1C	168.00	0.000416	19.63	910.	43.25	27.95
805 841 45+84.60 100.27 44+11.60 100.28 58X63 GOTHIC 27.00 C.000370 19.63 .016		POS PR !	43443.00	100.16	45+84.60	100.27	54 X 63	GOTHIC	241.60	0.000372	17.90	9 10 •	35.07	23,31
		80S BR I		100.27	44+11.60	100.28	58 x 63	GOTHIC	27.00	0.000370	19.63		62.00	26.36

TAPLE A-1 MCC INTERCEPTORS NORTH SYSTEM

NC NC	707	FROM	INVER T	STATION	INVERT (FT)	SIZE	SHAPE	(FT)	S_02E	(SO=T)	z z	CES) (	(MGD)
U	EOS ERI	46+11.60	100.28	47+34.00	100.33	54×63	COTHIC	122.40	0.000408	17.90	910.	37.41	24.18
U	FOS PR I	47+34.00	100.33	£0+ 82 • 08	100.47	58 X 6.3	GOTHIC	348.08	0.000.02	19.63	910.	45.41	27.41
·	BOS PR 1	50+82.08	100.47	54+13.29	100.72	48	CIRCULAR	12.157	0.000341	38.48	910.	10.96	65.09
U	POS PP [	58+13.29	100.72	59+19-65	100.76	58×63	GOTHIC	106.36	0.000376	19.63	910.	41.12	26.57
0	BRI	00.0000	100.76	7.45.00	101.06	5.8	CISCULAR	745.00	0.000402	18.35	910.	38.67	24.99
0	188	7445.00	101.06	7.85.00	101.07		TRANSIT TON	40.00	0.000050				
	1 88	7+85.00	101.07	53+00-25	102.88	54x61.5	60THIC	4515.25	00000000	18.38	910.	38.89	25.13
	ROS	00.00+0	102.88	15+81.00	103.51	54X61.5	ботніс	1581.60	0.000398	18.38	910.	39.89	25.13
	POS	15+81.00	103.51	16+31.00	103.53	9.5	CIRCU_AP	20.05	0.000400	18.35	910.	38.67	24.99
w	ecs	16+11.00	103.53	80+27-19	106.09	54X61.5	GOTHIC	6396.19	00000000	18.38	• 01 6	34.89	25.13
	NEW WAT	0.00.00	106.09	57+08-00	108.37	\$0x57.5	GOTHIC	5708.00	0.000399	15.93	9 10.	32.02	50.69
	NEW WAT	57+CP.0C	108.37	57+17.00	108.38		TRANSIT I'M	00.6	0.001111				
_	NEW WAT	57+17.00	108.38	76+93.98	109.17	47 X53	GOT H I C	1976.98	0.000399	13.83 .	9 10 •	56.64	17.22
	NFK	0+00+0	109.17	12+55.00	100.67	47 x 53	GOTHIC	1255.00	0.000398	13.83 .016	910	20.04	17.22
9	***	12+55.00	105.67	17.07.00	115.55	42 X4 H	S0THIC	452.00	0.013008	11.16	910.	113.90	73.61
o	NEW	17+67.00	115.55	28+00.00	116.27	42 X 4 B	G0T H I C	1093.00	0.000658	11.16 .016	910	19.62	16.55
I	NEW	28+00.00	116.27	57+15.00	118.20	42 X48	SETHIC	2915.00	0.000662	11.16 .016	910	25.79	16.67
I	P	57+15.00	116.20	57+35.00	118.24		TEANSIT ION	18.00	0.002222				
1	NE .	57+35.00	118.24	58+25.00	118.44	45 x 54	RECTANGULAR	00.06	0.002222	9.06 .016	910		
1	N. N.	58+25.00	118.44	58+45-00	118.49		TRANSIT ION	20.00	0.002500				
ı	N N	58+45.00	118.49	58+65.00	118.56	42 X 4 B	GOTHIC	20.00	0.003500	11.16	9 10 .	80.65	39.18
1	NFA	58+65.00	118.56	29+ 00 • 00	120.54	42×48	60T H IC	35.00	0.356571	111.16 .016		237.50	153.49

TABLE A-1 MOC INTERCEPTORS NORTH SYSTEM

H NEW 59+00.0C 120.54    BRO ROS 2+51.37 P4.15     BROS CAM 34+72.84 89.51     BOS CAM 34+72.84 89.51     BOS CAM 42+4P.50 92.61     BOS CAM 42+4P.50 92.61     BOS CAM 86+08.12 94.82     BOS CAM 86+08.12 94.82     BOS CAM 86+08.12 94.82     WAT BOS CAM 86+08.12 94.82     WAT BOS 255+78.0C 95.42     WAT NEW 258+77.0C 105.18     WAT NEW 258+78.0C 106.18     WAL 336+44.00 113.25     WAL 336+44.00 116.39     WAL 336+44.00 116.39     WAL 336+44.00 120.39     WAL 336+44.00 120.39     WAL 128+13.37 105.98     ODR 128+31.32 106.24     ODR 128+31.33 106.34     ODR 128+31.34 106.34     ODR 1	FROM		(FT)	STATION	(FT)	SIZE	SHAPE	LENGTH (FT)	SL 3P E	AREA MANN	CFS) (	( MGD)
### BRO ### 2451.37 #4.15  #### BOS CAM 34.72.84 #9.51  #### BOS CAM 34.72.84 #9.51  ###################################	29+0		120.54	72+84.00	121.47	42×48	S0THIC	1384.00	0.000671	11.16 .016	25.87	16.72
### ### ##############################		1.37	64.15	80+05.45	R6.90	108	CIRCULAR	7883.08	4.967424	63.62 .016	190.20	122.92
### ### ##############################		7.64	16.99	34+72.84	89.51	88X117.25	HGRSESHDE	1535.18	056000.0	58.72 .016	182.90	118.20
### ### ##############################		2.84	89.51	42+48.50	19.26	2-60	NDHdIS	775.66		39.28 .01		
FOS CAM R6+CR.12 94.57  FOS CAM R6+CR.12 94.82  FOS 106+O0.CO 95.62  FOS 151+23.CC 97.83  RAT FOS 151+23.CC 97.85  WAT FOS 255+78.OC 104.19  WAT FOS 255+78.OC 106.18  WAT NEW 258+27.OC 105.18  WAT NEW 336+44.OO 113.25  WAL 390+4C.CO 120.39  A WAL 403+86.62 123.76  FOR 128+13.37 105.98		P.50	92.61	86+08-12	94.57	84×112	HORSESADE	4523.00	0.000449	53.53 .016	171.60	110.90
### ### ##############################		8.12	44.57	86+08-12	94.82		DROP MANHOLE					
EOS 106+00.00 95.62 EOS 151+23.CC 97.85 WAT EOS 151+23.CO 97.85 WAT EOS 255+78.OC 104.19 WAT EOS 255+78.OC 105.18 WAT NEW 258+27.OC 105.18 WAT NEW 258+27.OC 115.25 WAT NEW 336+44.OO 1113.25 WAL 390+46.CO 120.39 A WAL 403+86.62 123.24 A WAL 403+86.62 123.24 OOR 128+13.37 105.98		8.12	94.82	105+99.95	45.62	81X108	HOP SES40F	1991.84	0.000401	49.78 .016	145.50	94.68
EDS 151+23.CC 57.43 EDS 151+23.CC 97.85 WAT EDS 164+36.CC 96.70 WAT EDS 255+78.OC 104.19 WAT EDS 255+78.OC 105.18 WAT NEW 258+27.OC 105.44 WAT NEW 336+44.OO 113.25 WAL 352+03.OO 116.30 A WAL 390+4C.CO 120.39 A WAL 403+86.62 123.76 COR 128+31.32 105.98	106+0	00.0	39.36	151+23.00	97.43	P1X108	HORSESHOE	4523.00	0.000400	49.78 .016	140.50	94.68
HAT ENS 151+23.C0 97.85  WAT ENS 164+36.0C 92.70  WAT ENS 255+78.0C 106.19  WAT ENS 255+78.0C 106.18  WAT NEW 258+27.0C 106.18  WAT NEW 336+44.0O 113.25  WAL 336+44.0O 116.30  A WAL 355+603.0C 116.30  A WAL 355+603.0C 120.39  A WAL 403+86.62 121.76  COR 128+13.37 106.98  DOR 128+31.32 106.24	151+2	3.00	57.43	151+23.00	97.85		DEOP MANHOLE					
WAT ENS 164+36.0C 56.70 WAT ENS 255+78.0C 104.19 WAT NEW 258+27.0C 105.18 WAT NEW 336+44.0O 113.25 WAT NEW 336+44.0O 114.75  WAL 352+03.0O 116.30  WAL 403+86.62 123.24  WAL 403+86.62 123.76  COR 128+31.32 106.24	151+2	3.00	97.85	164+36.00	04.70	76×101.25	HORSESHOE	1313.00	0.000647	43.80 .016	157.30	101.66
WAT EDS 255+78.0C 104.19 WAT EDS 255+78.0C 105.18 WAT NEW 236+44.0C 113.25 WAT NEW 336+44.0C 114.75 WAL 352+03.0C 116.3C WAL 390+4C.CC 120.39 WAL 401+78.0C 123.24 WAL 403+86.62 123.76 COP 128+13.37 105.98 DOOR 128+31.32 106.24		20.9	01.95	255+78.00	104.19	72	CIRCULAR	9142.00	0.000600	28.27 .015	90.11	58.24
WAT EOS 255+78.0C 105.18 WAT NEW 258+27.0C 105.44 WAT NEW 336+44.0O 113.25 WAL 336+44.0O 116.30 A WAL 352+03.0O 116.30 A WAL 390+46.CO 120.39 A WAL 403+86.62 123.24 COR 128+31.32 106.24			104.19	255+78.00	105.18		CROP MANHOLE					
WAT NEW 258+27.00 105.44  WAT NEW 336+44.00 113.25  WAL 358+44.00 114.75  WAL 358+44.00 116.30  WAL 358+64.00 116.30  WAL 403+86.62 123.24  WAL 403+86.62 123.76  COR 128+13.37 105.98			105.18	258+36.00	105.44	0	CIRCULAR	258.00	0.001007	19.64 .015	71.53	45.23
WAT NEW 336+44.00 113.25  WAL 352+03.00 114.75  WAL 390+4C.C0 120.39  WAL 401+78.00 123.24  WAL 403+86.62 123.76  FOR 128+31.32 106.24			105.44	336+44 .00	113.25	09	CIRCULAR	7817.00	666000.0	19.64 .015	71.50	46.21
MAT NEW 336+44.00 114.75  MAL 252+03.00 116.30  MAL 390+46.C0 120.39  MAL 401+78.00 123.24  MAL 403+86.67 127.76  FOR 128+13.37 105.98  DOR 128+31.32 106.24			113.25	336+44.00	114.75		DEOP MANHOLE					
A WAL 352+03.00 116.30 A WAL 390+46.c0 120.39 A WAL 403+86.63 123.24 COR 128+13.37 105.98 DOR 128+31.32 106.24			114.75	352+03-00	116.30	5 4	CIRCULAR	1559.00	0.000994	9.62 .015	27.54	17.80
A WAL 390+46.60 120.39 A WAL 401+78.00 123.24 A WAL 403+86.62 123.76 COP 128+13.37 105.98 DOP 128+31.32 106.24	352+0		116.30	39+40-00	120.39	42	CIRCULAP	3837.60	0.001065	9.62 .015	28.51	18.43
A WAL 401+78.00 123.24 A WAL 403+86.62 127.76 FOR 128+13.37 105.98 DOR 128+31.32 106.24	390+4		120.39	401+78.00	123.24	36	CIRCULAP	1138.01	0.002506	7.07 .015	28.99	18.74
A WAL 403+86.63 123.76 FOR 128+13.37 105.98 DOR 128+31.32 106.24	401+7		123.24	403+86.63	123.76	02	CIRCULAR	208.63	0.002506	4.91 .015	17.83	11.52
COR 128+13,37 105,98	403+8		123.76	441+64.00	133.21	36	CIRCU_AP	3777.36	0.002506	7.07 .015	23.99	18.74
DOR 128+31,32 106.24	128+1		105.98	128+31-32	106.24	75	CIRCULAR	17.95	0.014484	15.90 .016	192.70	124.54
	128+3		106.24	163+95.27	108.01	36 x 4 P	EGG	3563.95	0.000496	9.34 .016	17.62	11.39

TABLE A-1 MDC INTERCEPTORS NORTH SYSTEM

SECT	רסכ	FROM INVERT TO	INVERT (FT)	TD STATION	INVERT (FT)	S12E (1N)	SHADE	LENGTH (FT)	LENGTH S_07E	A4EA MALN (SO=T) L	Z 7 7 4	AREA MAUN CAPACITY (SOFT) A (CFS) (MGD)	( MGD )
01	nge	163+95.27	108.00	163+95.27 108.00 179+89.95 108.80	108.80	36×4F	F 66	1594.68	1594.68 0.000501	9.34	9.34 .016	17.08	11.04
=	DOR	179+80,95	1 66.80	179+89.95 168-80 183+10.60 108.81	108.81	36 X48	FGG	20.04	20.64 0.000499	9.34	9.34 .016	17.62	11.39
=	800	180+10.00	108.81	180+10.00 108.81 189455.00 115.98	115.98	28 X 4 2	F 66	945.00	945.00 0.007587	6.48	6.48 .016	45.03	27.16
=	407	189+55.00	115.98	193+81.81	117.54	28 X42	F G G	426.97	0.003653	6.48	910. 84.9	29.16	19.85
12	800	0+00+0	117.56	0+10.00 120.02	120.02	28×42	F GG	10.00	10.00 0.246000	6.48	910.	6.48 .016 239.30 154.65	154.65
12	POG	0+10.00 120.02	120.02	9+85.09 121.00	121.00	36 x 37	FXT. CIPCLE	62.670	075.09 0.001005	7.32	7.32 .016	17.94	11.59
13	COR	0+00.00 121.00	121,00	38+00.00 124.80	124.80	36 x17 .75	FXT. CIPCLE	3800.00	0.001000	7.51	7.51 .016	18.58	12.01
•	900	0+00.CC 124.8C	124.80	15+89.00 126.69	126.69	36×37.50	EXT. CIPCLE	1689.00	1689.00 0.001119	7.44	7.44 .016	19.48	12.59
*	800	16+89.00 126.69	126.69	19428.50 126.93	126.93	30X31.5	EXT. CIPOLE	239.50	0.001002	5.22	5.22 .016	11.48	7.42
:	MTN CON	N 0+00.00 126.37	126.37	1+92.00 126.62	126.62	20	CIRCULAP	192.00	192.00 0.301300	2.13	2.13 .016	4.10	5.65
15	GH BUJ	P 0+00.00 126.93	126.93	14+47.00 128.38	128.38	30X31.5	FXT. CIRCLE	1447.00	1447.00 0.001002	5.22	5.22 .016	11.48	7.42
5	COR HP	P 17+80.C0 127.95	127.95	14+65.00 128.40	128.40	54 x55 .75	EXT. CIPCLE	315.00	315.00 6.301428	16.56 .016	9 10 •	63.79	41.23

TABLE A-2 MDC INTERCEPTORS SOUTH SYSTEM

SECT	707	FROM	INVERT (FT)	STATION	INVERT (FT)	S12E (IN)	SHAPE	LENGTH (FT)	SLOPE	(SOFT)	Z Z Z	CAPACITY (CFS) (	(MGD)
15	00R HP	17+95.00	128.73	24+70,30	129.40	54 X 55 • 75	EXT. CIRCLE	675.30	0.000992	16.56 .	• 016	53.17	34.36
91	ď.	00.00.0	129.40	17+10.00	131.11	54X55.5	EXT. CIRCLE	1710.00	0.001000	16.47 .	910.	53.07	34.30
91	ď.	17+10.00	131.11	17+18.00	131.21		TRANSITION	8.00	0.001000				
91	d	17+18.00	131.21	23+79.29	131.88	51X52.5	EXT. CIPCLE	661.29	0.001013	14.72 .	910.	45.99	24.72
11	a I	00.00+0	131.86	17+68-72	133.63	51.5x52.5	EXT. CIRCLE	1768.72	0.001000	14.82 .	910.	45.97	29.71
81	d I	00.00.0	133.63	27+19.35	136.35	51 x52 • 75	EXT. CIRCLE	2719.35	0.001000	14.81	910.	45.97	29.71
19	<u>Q</u>	00.00+0	136.35	12+90.00	137.74	51 X52 • 75	EXT. CIRCLE	1290.00	0.001077	14.81	910.	47.71	30.83
61	ď.	12+90.00	137.74	26+50.96	139.10	48X49.75	EXT. CIPCLE	1360.96	0.0000999	13,15	.016	39.24	25.36
50	ā.	0 • 00 • 0	139.10	30+57.70	142.15	48X49.75	EXT. CIRCLE	3057.70	0.000997	13.15 .	910.	39.24	25.36
50	d I	30+57.70	142.15	30+57.70	144.51		DROP MANHOLE						
50	<u>a</u>	30+57.70	144.51	32+12.59	144.66	48X49.75	EXT. CIPCLE	154.89	0.000968	13.15 .	910.	38.61	24.95
17	HP DED	00.00+0	144.66	0+80.00	144.81	48X50	EXT. CIRCLE	80.00	0.001875	13.23 .	910.	54.09	34.96
21	HP DED	0+80.00	144.81	1+60.00	144.98	48X50	EXT. CIRCLE	80.00	0.002125	13.23 .	910.	57.58	37.21
21	ИР DEO	1+60.00	144.98	35+98.62	148.42	48×50	FXT. CIRCLE	3434.62	0.001000	13.23 .	910.	39.50	25.53
25	DED	00.00.0	148.42	10+48.00	154.50	48X49.5	EXT. CIRCLE	1048.00	0.005801	13.07	.016	93.91	69.09
25	DED	10+48.00	154.50	10+48.00	159.50		DROP MANHOLE						
22	050	10+48.00	159.50	13+29.18	159.77	48X49.5	FXT. CIRCLE	281.18	0.000960	13.07 .	.016	39.20	54.69
25	0.00	13+29.18	159.77	13+29.18	164.45		DROP MANHOLE						
25	DED	13+29-18	164.45	24+03.71	165.50	44X49.5	FXT. CIRCLE	1074.53	0.000977	13.07	910.	38.54	16.45
23	050	00.00+0	165.50	00.06+0	165.60	48X49.5	EXT. CIRCLE	00.06	0.301111	13.07	910.	41.10	26.56
23	DED	00.06.0	165.60	00.00+0	168.60		DROP MANHOLE						
23	DED	0+40.00 168.60	168.60	8+00.00	169.29	48×49.5	EXT. CIRCLE	710.00	0.000971	13.07 .016	910	34.42	24.83

TABLE A-2 MDC INTERCEPTORS SOUTH SYSTEM

SECT	707	FROM	INVERT (FT)	STATION	INVERT (FT)	S12E (IN)	SHAPE	(FT)	St Opf	(SOFT)	Z 2 2 4 2 2 4 2 2	CAPACITY (CFS)	(MGD)
23	0.50	8+00.00	169.29	8+00-00	172.75		DROP MANHOLE						
23	OEO	8+00.00	172.75	25+95.98	173.94	48X49.5	EXT. CIRCLE	1795.98	0.000662	13.07	.016	31.84	20.58
54	0€0	00.00.0	173.94	0+18.00	173.99	48X49.5	EXT. CIRCLF	78.00	0.000641	13.07	.016	31.21	20.17
54	DED	00.87+0	173.99	0+84.00	174.09		TRANSITION	00.9	9.016666				
54	DED	00.84.00	174.09	24+66.15	175.68	45K46.5	EXT. CIRCLE	2382.15	0.000667	11.51	• 015	26.90	17.38
52	DED	00.00.0	175.68	4+75.00	176.00	45X46	FXT. CIRCLE	4 75.00	0.000674	11.36 .016	.016	26.48	17.11
25	DED	4.75.00	176.00	26+65.94	177.10	45X46	EXT. CIRCLE	2190.94	0.000502	11.36	910.	22.61	14.74
56	DED WRO	00.00.0	177.10	8+57.00	177.53	45X46.5	EXT. CIRCLE	857.00	10500000	11.51 .015	.016	24.11	15.58
56	DED WRO	8+57.00	177.53	13+08.80	177.75	45X48	EXT. CIRCLE	451.80	0.000486	11.94	.016	24.26	15.68
56	DED WRO	13+08-80	177.75	22+08.00	178.40	45X48.5	EXT. CIPCLE	899.20	0.000722	12.14 .016	.016	86.62	19.38
56	DED WRD	22+08-00	178.40	22+13.00	178.39		TRANSITION	5.00					
56	DED WRO	22+13.00	178.39	22+39.00	178.22	45X46.75	EXT. CIPCLE	26.00		11.59 .016	910.		
56	DED WRO	22+39.00	178.22	22+39.00	178.59		DROP MANHOLE						
56	DED WRO	22+39.00	178.59	22+52.00	179.59		TRANSITION	13.00					
92	DED WRO	22+52.00	178.59	28+35.00	179.15	34 X 36	FXT. CIRCLE	583.00	0.000960	6.78 .016	910.	15.94	10.30
92	DED WRO	28+35.00	179.15	40+70.20	180.33	34×35.5	EXT. CIRCLE	1235.20	0.000955	6.66 .016	.016	15.43	16.6
27	#RO	00.00+0	180.33	10+20.00	181.33	34×36	EXT. CIRCLE	1050.00	0.000952	6.78	910.	15.86	10.25
27	WRO	10+50.00	181.33	22 +90 . 00	182.73	34×39	EXT. CIRCLE	1240.00	0.001129	7.49	7.49 .016	19.74	12.76
27	WRO	22+90.00	182.73	26+15.00	182.81	34 X35	EXT. CIRCLE	325.00	0.000246	6.54	.016	7.70	4.98
27	*RO	26+15.00	182.81	32+70.00	183.44	34 X37	EXT. CIRCLE	655.00	19600000	10.1	.016	16.68	10.78
27	NRO NRO	32+70.00	183.44	34+45.00	183.43	34K35.5	EXT. CIRCLE	175.00		6.66	910. 99.9		
27	<b>880</b>	34+45.00	183.43	34+57-70	183.44		TRANSITION	12.70	0.000787				

TABLE A-2 MDC INTERCEPTORS SOUTH SYSTEM

SECT	100	FROM	INVERT (FT)	STATION	INVERT (FT)	SIZE (IN)	SHAPF	LENGTH (FT)	SLOPE	(SOFT)	ZZZ	CAPACITY (CFS) (	( MGD )
28	• RO	00.00+0	183.44	00*01+0	183.70		TRANSITION	10.00	0.026000				
28	*RO	00.01+0	183.70	33+33.21	186.88	32X32.75	EXT. CIRCLE	3323.21	0.000956	5.75 .016	910.	12.76	8.25
28	#RO	33+33,21	186.88	33+33.21	189.51		DROP MANHOLF						
28	480	33+33 -21	189.51	45+67.02	191.32	26X26.75	FXT. CIRCLE	1233,81	0.001467	3.92	.016	9.20	5.95
53	WRO	00.00+0	191.32	4+48.51	66.161	26X26.25	EXT. CIRCLE	448.51	0.001493	3.73	910.	16.8	5.80
50	WRO	4+48.51	191.99	4+48.51	191.99		DROP MANHOLE						
58	# RO	4+48.51	196.49	24+01.51	2 00 • 00	20	CIRCULAR	1953.00	0.001797	2.18 .015	510	51.5	3.33
62	WAO	24+01-51	200.00	24+01.51	200.55		DROP MANHOLE						
50	#RO	24+01.51	200 - 55	37+54.96	203.24	15	CIRCULAR	1353,45	0.002024	1.23 .015	510.	2.52	1.63
58	WRO	37+54.96	203.24	45+57.88	210.02	15	CIRCULAR	802.92	0.008444	1.23 .015	.015	51.5	3.33
50	WRO	45+57.88	210.02	47+13-12	216.82	12	CIRCULAR	155.24	0.043803	210. 67.	.015	6.47	4.18
30	WRO NEW	00.00.0	192.20	23+55.99	197.89	54	CIRCULAR	2355.99	0.002415	3.14 .015	510.	9.65	6.24
30	WRO NEW	23+55.99	197.89	23+55.99	198.64		DROP MANHOLE						
30	WRO NEW	23+55.99	198.64	34+82.25	221.17	15	CIRCULAR	1126.26	0.020004	1.23 .015	.015	7.93	5.12
30	WRO NEW	34+82.25	221.17	46+25.41	224.03	6.	CIRCULAR	1143.16	0.002501	1.77 .015	.015	4.56	2.95
30	WRO NEW	46+25-41	224.03	46+25-41	224.28		DROP MANHOLE						
30	WRO NEW	46+25.41	224.28	52+09.79	235.98	15	CIRCULAR	584.38	0.020021	1.23 .015	.015	7.93	5.12
30	WRO NEW	52+09-79	235.98	67+18.00	239.76	•	CIRCULAP	1508.21	0.002506	1.77 .015	.015	4.56	2.95
31	MTN HP	00.00.0	133.09	1+60.00	133.24	54 x 60	EXT. CIRCLE	160.00	0.000938	18.15 .016	910.	58.57	37.85
31	MTN HP	1+60.00	133.24	3+04.00	134.20	2-30	NOHAIS	144.00	0.006666	9.82	910.	41.47	26.80
31	MTN HP	3+0+.00	134.20	3+13.00	134.20	54 X60	EXT. CIPCLE	00.6		18.15	910.		
32	CAN DED	00.00+0	137.14	15+82.00	140.47	18	CIRCULAR	1582.00	0.002105	1.77	.015	4.25	2.75

TABLE A-2 MDC INTERCEPTORS SOUTH SYSTEM

SECT	700	FROM	INVERT (FT)	STATION	INVERT (FT)	S1 ZE (IN)	SHAPE	(FT)	SLOPF	(SOFT)	Z Z	CAPACITY (CFS)	(MGD)
32	CAN DED	15+82.00	140.47	16+88.00	141.47	2-12	SIPHON	106.00	0.009434	1.57	\$10.	5.17	3.34
32	CAN DED	16+88.00 141.47	141.47	22+47.00	143.00	18	CIRCULAR	259.00	0.002737	210. 77.1	\$10.	4.77	3.08
£4	100	0+12.00	109.86	14+12.00	74.50		TREAT. PLANT	1400.00					
:	100	00.00.0	109.86	12+69-27	110.21		NI CHANGES	1268.27					
\$	100	00.00+0	110.21	9+68.00	110.49	135x150	HORSESHUE	968.00	0.000289	116.68 .014	.10.	441.40	285.27
•	JOO	00.00.00	110.49	70.16+7	110.68	135x150	HORSE SHOF	791.07	0.000240	116.68 .014	.10.	402.70	260.26
1.	100	00.00+0	110.68	31+61.82	1111.55	135×150	HORSE SHOE	3161.92	0.000275	116.58 .014	.010	434.40	280.74
8	100	00.00+0	111.55	58+80.58	113.17	135X150	HOP SE SHUE	5880.58	0.000275	116.68 .014	.010.	434.40	240.74
6	300	00.00.0	113.17	34+94.21	114.13	135X150	HORSESHOF	3494.21	0.000274	116.68 .014	.10.	432.10	279.26
20	100	0+00+0	114.13	00-18-00	114.14	135X150	HORSFSHOF	18.00	0.000555	116.6₽ .014	.10.	614.90	397.40
20	100	0+18.00	11.4.11	0+38.00	114.14		TRANSITION	20.00					
20	100	0+38.00	114.14	2+10.00	114.19	135×102	HORSE SHOE	172.00	0.000290	+10. 66.18	.10.	277.80	179.54
20	100	2+10.00	114.19	2+30.00	61.411		TRANS: (10N	20.00					
20	100	2+30.00	114.19	30+71.38	114.98	135X150	HOR SE SHOF	2841.38	0.000278	116.68 .014	.10.	434.40	280.74
15	100	00.00+0	114.98	23+65.00	115.65	135x150	HUPSE SHOE	2366.00	0.000283	116.68 .014	.10.	441.40	285.27
25	100	00.00.00	115.65	27+74.43	116.41	132×147	HORSE SHOE	2774.43	0.030273	111.83 .014	.10.	407.20	263.16
53	100	00.00.00	116.41	19+00-00	116.93	132×147	HORSE SHOE	1900.00	0.000273	111.83 .014	.10.	412.50	566.59
*5	100	00.00.00	116.93	19.68.61	117.48	132×147	HORSESHOE	1989.81	0.000276	111.83	410.	412.50	266.59
55	001 MTN	00.00.00	117.48	30+00-00	118.31	132×144	HORSE SHOF	3000.00	0.000276	100.59	.010	397.10	256.64
55	-	30+00.00	118.31	30+14.00	118.31		TRANSITION	14.00					
55	-	30+14.00	116.31	35+56.63	119.46	9F 1X751	HORSE SHOF	542.63	0.000276	102.22	•10.	362.20	234.0A
99	MTM	00.00.00	118.46	14+99.78	118.87	127X139	HOR SE SHOF	1499.78	0.000273	102.22	•10.	366.10	236.60

TABLE A-2 MDC INTERCEPTORS SOUTH SYSTEM

SECT	707	STATION	(FT)	STAT ION	INVERT (FT)	SIZE (IN)	SHAPE	LENGTH (FT)	SL OPE	(SOFT)	ZZZ	CAPACITY (CFS) (	(MGD)
25	I Z	00.00.0	118.87	18+68-79	119.39	127X139	HOR SE SHOE	1868.79	0.000278	102.22 .	•10.	366.10	236.60
98	Z.	0+00 •00	119.39	14+22.00	119.79	127X139	HORSESHOE	1422.00	0.000281	102.22 .	+10.	368.17	237.94
88	ž	14+22.00	119.79	14+32.00	119.79		TRANSITION	10.00					
88	Z Z	14+32.00	119.79	14+46.00	119.79	127X105.5	HORSESHOE	14.00		. 06.69	•10.		
58	ž	14+46.00	119.79	14+56.00	119.80		TRANSITION	10.00	0.001000				
28	Z Z	14+56.00	119.80	25+59.68	120.12	127X139	HOR SE SHOF	1103.68	0.000290	102.22	+10.	372.67	240.90
65	Z T Z	0+00*00	120-12	25+67.57	120.84	127X139	HOR SE SHOE	2567.57	0.000280	102.22	+10.	366.10	236.60
09	Z T	0+00+0	120.84	16+09-79	121.28	1271139	HOR SE SHOE	1609.79	0.000273	102.22 .	+10.	366.10	236.60
19	M T T	00.00+0	121.28	27+90-00	122.08	127X139	HORSESHOE	2790.00	0.000286	102.22 .	+10.	370.00	239.12
19	E TR	27+90.00	122.08	27+94.00	122.08		TRANSITION	•••					
19	Z Z	27+94.00	122.08	28+15-00	122.09	127X127	HOR SE SHOF	21.00	0.000476	94.89	.014	433.00	279.84
19	Z Z	28+15.00	122.09	28+19.00	122.09		TRANSITION	** 00					
	2	28+19.00	122.09	28+26.97	122.09	127X139	HORSESHOE	7.97	0.000282	102.22	+10.	370.00	239.12
62	ž	00.00.0	122.09	21+73-39	122.69	127X139	HOR SE SHOE	2173.39	0.000276	102.22 .	+10.	364.20	235.37
63	2	00.00+0	122.69	22+62.47	123.33	127X139	HOR SE SHOE	2262.47	0.000282	102.22	.10.	370.00	239.12
*	M MTM	00.00.00	123.29	0+52-12	123.33	127X139	HORSE SHOE	52.12	0.000767	102.22	*10.	606.20	301.77
	HP MTN	N 0+52.12	123.33	2+10.00	123.78	3-60.5	SIPHON	157.88		59.86	+10.	215.45	139.27
*	M M T	2+10.00	123.78	2+71.75	123.80	127X139	HORSESHOF	61.75	0.000323	102.22	+10.	393.80	254.50
92	<u>•</u>	0+00+0	123.80	6+45.50	123.98	127×139	HORSESHOE	645.50	0.000278	102.22	+10.	364.20	235.37
99	4	6+45.50	123.98	00.00+6	124.05	1111122	HORSESHOF	254.50	0.000275	₹10. 88.77		253.40	163.77
9.0	NEP VAL	6+10.82	123.97			S4X55.75	EXT. CIPCLE			16.56 .016	910		
99	Q.	0+00.00 124.05	124.05	53+00.00	125.54	111X122	HORSESHOE	5300.00	0.000281	17.88 .014		255.70	165.25

TABLE A-2 MDC INTERCEPTORS SOUTH SYSTEM

Habita   1.474.64   125.60   125.64   125.60   111X122   HDRSESHUE   174.64   0.000143   77.69   111.71   77.49   125.60   125.64   125.60   125.68   111X122   HDRSESHUE   0.00016   77.69   77.69   77.10	SECT	707	STATION	INVERT (FT)	STATION	INVERT (FT)	SIZE (IN)	SHAPE	LENGTH (FT)	SLOPE	(SOFT)	2 2	CAPACITY (CFS) (	(MGD)
Haracool   1.77.464   125.66   125.66   125.66   111X122   HORSESHOE   631.10   0.000316   77.49   0.14   271.10   77.49   1.01   77.49   1		9	00.00.0		1+74.64	125.60	111 x 122	HORSE SHUE	174.64	0.000343	17.88	410.	282.00	182.25
He   He   He	29	Q.	1+74.64		2+64.96	125.84	2-84	CIRCULAR	90.32	0.002657	76.97	410.	314.70	203.38
He   He   He   He   He   He   He   He	29	Ġ.	2+64.96		3+28.06	125.86	111×122	HOR SE SHOE	63.10	0.000316	17.88	•014	271.10	175.21
HP   HP   HP   HP   HP   HP   HP   HP	99				17+55.00	126.66	111×122	HOR SE SHOE	1755.00	0.000455	77.88	.014	324.80	16.605
HP   HP   HP   HP   F216.46   126.61   126.62   126.64   105x111   HPRESHUE   428.00   0.000217   66.22 014   103.40   126.62   126.62   126.64	89				22+64.00	126.81	105×116	HORSESHOF	200.00	0.000294	69.83	.10.	225.70	145.87
Mail	89				23+10.00	126.82		REDUCER	*6.00	0.000217				
WRO         1         5.64.00         126.64         5.64.00         126.78         105X111         HORSESHUE         50.00         0.000271         66.22 .014         703.00           WRO         1         5.64.00         126.78         126.70	89				27+38.00	126.64	105×111	HORSESHOE	428.00		66.22	.10.		
MRG   S   S   S   S   S   S   S   S   S	69	480	00.00+0		2+04.00	126.78	105×111	HORSESHUE	204.00		66.22	.014	203.90	131.78
MRG   State	69	WRO	2+04.00		2+54.00	126.80		TRANSITION	20.00					
MRG         05         11-63-00         127-38         10-94-67         127-60         105X116         HORSESHUE         1094-67         0.000452         25-12         014         166-10         1           WRG         05         11-63-00         127-64         127-65         127-65         2-48         CIRCULAR         86-33         0.000452         25-12         014         52-93           WRG         05         11-63-00         127-64         127-65         127-65         2-36         CIRCULAR         13.50         0.000740         14-11         014         31-65           WRG         05         127-64         127-66         127-66         127-66         127-66         127-66         127-66         127-66         127-69         127-69         127-69         127-69         127-60         127-69         127-69         127-60         127-69         127-69         127-60         127-69         127-	69	980			25+96-17	127.38	105x116	HORSE SHOE	2042.17	0.000284	69.63	+10.	222.60	143.86
WRO         OS         11+83.00         127.60         127.65         2-48         CIRCULAR         AB.33         0.000452         25.12 .014         52.93           WRO         OS         11+83.00         127.65         127.65         2-36         CIRCULAR         14.00         0.000740         14.14 .014         52.93           WRO         OS         11+83.00         127.65         127.65         2-36         CIRCULAR         7.50         14.14 .014         31.65           WRO         OS         127.10.50         127.60         127.60         127.60         105.62         127.60         107.66         127.60         107.60         127.60         107.60         127.60 </td <td>10</td> <td>-RO</td> <td>00.00.0</td> <td></td> <td>10+04.67</td> <td>127.60</td> <td>105x116</td> <td>HORSE SHOE</td> <td>1094.67</td> <td>0.000000</td> <td>69.83</td> <td>•10.</td> <td>186.10</td> <td>120.27</td>	10	-RO	00.00.0		10+04.67	127.60	105x116	HORSE SHOE	1094.67	0.000000	69.83	•10.	186.10	120.27
05 11+97.00 127.64 11+97.00 127.65 2-36 CIRCULAP 13.50 0.000740 14.14.014 31.65 05 12+10.50 127.66 12+16.00 127.66 12+16.00 127.66 12+16.00 127.66 12+16.00 127.66 127.60 127.66 127.60 127.66 127.60	10				11+83.00	127.60	84-2	CIRCULAR	86.33	0.000452	25.12	.014	52.93	34.21
WRO         OS         11+97.00         127.65         127.66         2-36         CIRCULAR         13.50         0.000740         14.14.014         31.65           WRO         OS         121.00.50         127.66         127.66         127.66         127.60         120.63	0.4				11+97.00	127.65		PEDUCER	14.00	0.000714				
WRD         OS         12+18.00         127.66         127.66         127.66         127.66         127.60         127.70         127.70         127.60         127.70	0.					127.66	2-36	CIRCULAR	13.50	0.000740	11.11	+10.	31.65	20.45
WRD         OS         12+18.00         127.66         12+86.65         127.70         2-48         CIRCULAR         64.66         0.0005R2         25.13.014         60.06           WRD         NS         10+94.67         127.60         127.60         127.60         127.60         127.60         127.60         127.60         127.60         127.69         127.69         0.0005R1         40.34.01         727.10         727.10           WRD         NS         12+78.66         127.69         127.69         127.69         0.0005R1         40.34.01         727.10           WRD         NS         12+84.66         127.69         127.69         105x62         RECTANGULAR         2.00         0.005500         34.11.014         727.10           WRD         NS         12+84.66         127.70         105x62         RECTANGULAR         2.00         0.005500         34.11.014         727.10	0.4				-	127.66		INCHEASER	7.50					
WRD         NS         10+96.67         127.60         1075K62         RECTANGULAR         2.00         0.000500         34.11 .014         322.10           WRD         NS         10+96.67         127.60         127.69         120x63         RECTANGULAR         175.99         0.000511         44.34 .014         322.10           WRD         NS         11+02.67         127.69         127.69         127.69         0.000511         44.34 .014         322.10           WRD         NS         12+84.66         127.69         127.69         105x62         RECTANGULAR         2.00         0.005000         34.11 .014         372.10           WRD         NS         12+86.66         127.70         105x62         RECTANGULAR         2.00         0.005000         34.11 .014         372.10	10				12.86.6	127.70	2-48	CIRCULAR	99.69		25.13	.10.	90.09	19.82
WRD NS 10+96.67 127.60 11+02.67 127.60 TRANSITION 6.00  WRD NS 11+02.67 127.69 12+86.66 127.70 TRANSITION 6.00  WRD NS 12+86.66 127.69 12+86.66 127.70 105x62 RECTANGULAR 2.00 0.0055000 34.11.014 322.10  WRD NS 12+86.66 127.70 37:15.00 128.45 105x116 HDRSESHDE 2448.34 0.000306 59.81.014 230.20	0.2				10.96.67	127.60	105x62	PECTANGULAR	5.00		34.11	.010	322.10	208.17
WRO NS 11:02.67 127.69 12:484.66 127.69 12:484.66 127.69 12:484.66 127.69 12:484.66 127.69 12:484.66 127.69 12:484.66 127.69 12:484.66 127.70 37:15:00 12:848.34 0:000306 34:11:014 230.20	0.2				11+02-67	127.60		TRANSITION	6.00					
WRO NS 12+78.66 127.69 12+84.66 127.70 105X62 RECTANGULAR 2.00 0.005000 34.11.014 322.10 WRO NS 12+84.66 127.70 37+75.00 128.45 105X115 HDRSESHOE 2448.34 0.000306 69.81.014 230.20	0.4				12+78.66	127.69	120×63	RECTANGULAR	175.99	0.000511	48.34		122.10	208.17
WRO NS 12+84.66 127.69 12+86.66 127.70 105x62 RECTANGULAR 2.00 0.005000 34.11.014 322.10 WRO 12+86.66 127.70 37+35.00 128.45 105x116 HDRSESHUE 2448.34 0.000306 69.81.014 230.20	0.4				12+84-66	127.69		TRANSITION	9.00					
WRG 12+86.66 127.70 37+35.00 128.45 105x116 HORSESHOE 2448.34 0.000306 69.83 .014 230.20	0.4				12+86-66		105x62	RECTANGULAR	2.00			.10.	122.10	208.17
	0.4	WRO	12+86.66	127.70	37+35.00	128.45	105X116	HORSE SHOE	2448.34		69.83	.10.	230.20	148.77

TARLE A-2 MDC INTERCEPTORS SOUTH SYSTEM

222.60 222.60 222.60 171.40 175.00 118.60 1113.10 1113.60 110.60 95.09	1 10	•				9		9			5	•	60				•					5
Location   170   171	(MGD)	143.86		110.77		143.86		134.75	113.10		76.65	73.09	91.45				88.28		76.20		71.48	61.45
LOC         STATIONA         FIRT IN STATION	(CFS)	222.60		171.40		222.60		208.50	175.00		118.60	113.10	141.50				136.60		117.90		110.60	95.08
MICH   Color   Color	Z Z Z	•10.		•10•		+10.					•10.	•014	•10.				•10.		.014			910.
LOC         STATION         TATALON         TA	(SOFT)	69.83		57.44		69.83		63.62	62.54		37.31	37.31	37.31		12.57	12.57	37.31		37.31		43.12	38.48
UAC         STATION         FEAT         TEAT         <	0.000285	0.000285			0.001428	0.000286	0.000495	0.000322	0.000238	0.024500	0.00040	0.000399	0.000625	0.033000			0.000582	606000000	0.000434	0.008812	0.000336	0.000331
LOC         STATION         ITERT         ITERT         ITERT         ITERT           WRO         0+00-00         129-04         29+79-38         129-89         105x116           WRO         29+79-38         129-89         29+86-38         129-89         105x116           WRO         29+79-38         129-89         29+92-63         129-89         105x116           WRO         29+92-63         129-89         29+93-63         129-89         105x116           WRO         0+00-00         131-25         9+63-00         131-48         9+63-00         131-48           WRO         0+00-00         131-48         9+63-00         134-07         78x84           ROX         0+00-00         134-08         0+16-00         134-07         78x84           ROX         0+00-00	(FT)	2979.38	7.00	6.25	7.00	10.83	20.20	4774.87	963.00	20.00	2000.00	3052.00	16.00	20.00	1405.00	1645.28	618.00	11.00	23.00	26.10	****	2472.60
MRO         0+00-00         128-45         20+64-65         129-04         105           WRO         0+00-00         128-45         20+64-65         129-04         105           WRO         29+86-38         129-69         29+86-38         129-89         105-89           WRO         29+92-63         129-89         29+90-63         129-89         100-80           WRO         29+92-63         129-89         29+90-63         129-89         100-80         100-80           WRO         29+92-63         129-89         29+90-63         129-89         29+90-63         129-89         100-80           WRO         129-86         29+90-63         129-89         29+90-63         129-89         100-80           WRO         0+00-00         131-25         9+63-00         131-48         9+63-00         131-97           WRO         0+00-00         131-48         9+63-00         134-07         7           ROX         0+00-00         134-08         0+16-00         134-07         7           ROX         0+16-00         134-06         0+16-00         134-07         7           ROX         0+16-00         134-06         0+16-00         134-07         14+41-00	HORSE SHOF	HORSESHOE	TRANSITION	HORSESHOE	TRANSITION	HORSESHOE	REDUCER	CIRCULAR	HOR SE SHOF	BELLMOUTH	HORSE SHOE	HORSESHOE	HORSESHOE	BELLMOUTH	CIRCULAR	CIRCULAR	HOR SE SHOE	BELLMOUTH	HOR SE SHOE	BELLMOUTH	HORSESHOE	CIRCULAR
LOC         STATION         (FT)         STATION           WRO         0+00-00         128-45         20+64-65         11           WRO         0+00-00         129-04         29+79-38         11           WRO         29+86-38         129-89         29+92-63         18           WRO         29+86-38         129-89         29+99-63         18           WRO         29+99-63         129-89         29+99-63         18           WRO         29+99-63         129-89         29+99-63         18           WRO         29+99-63         129-89         29+99-63         18           WRO         0+00-00         129-89         29+99-63         18           WRO         0+00-00         129-89         29+99-63         18           WRO         0+00-00         131-85         9+63-00         1           WRO         0+00-00         131-85         9+63-00         1           ROX         0+00-00         134-06         0+16-00         1           ROX         0+16-00         134-75         14+41-00         1           ROX         0+16-00         134-75         14+41-00         1           ROX         0+1	(IN) (IN) 105x116	911x501		16×501		105X116		109	011x66		78×84	78×84	78×84		4 8FM	48FM	78X84		78×84		84×84	:
MRO         0+00.00         128.45           WRO         0+00.00         128.45           WRO         0+00.00         129.04           WRO         29+79.38         129.89           WRO         29+86.38         129.89           WRO         29+92.63         129.89           WRO         29+99.63         129.89           WRO         29+99.63         129.89           WRO         0+00.00         131.25           WRO         0+00.00         131.25           WRO         0+00.00         131.48           WRO         0+00.00         131.48           ROX         0+00.00         134.75           ROX         0+36.00         134.75           ROX         0+36.00         134.75           ROX         0+36.00         95.78           ROX         0+36.00         95.78           ROX         0+22.00         95.79           ROX         0+652.00         95.79           WRO         0+00.00         132.00           WRO         0+00.00         132.00								_														
WRO 29+99-63 WRO 29+96-38 WRO 29+96-38 WRO ROX 29+99-63 WRO ROX 9+63.00 WRO ROX 9+63.00 ROX 0+16.00 ROX 0+16.00 ROX 0+36.00 ROX 0+652.00 ROX 0+652.00	(FT)	129.89	129.89	129.89	129.9	129.9	129.8	131.36	131.48	131.97	132.85	134.07	134.09	134.75	102.90	1 02 • 90	95.78	95.79	95.80	96.03	132.15	132.97
WRO	65																					
1	STATION 20+64-65	29+79.38	29+86.38	29+92-63	29+99.63	30+10.46	00.00+0	47+74.87	00.63.00	9+83.00	29+83.00	30+52.00	0+16.00	0+36.00	14441.00	16+81.28	6+18.00	6+29.00	6+52.00	6+78-10	4+46.00	29+18.60
20 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	(FT) STATION 00 128.45 20+64.65	129.04 29+79.38	129.89 29+86.38	129.89 29+92.63	129.89 29+99.63	129.90 30+10.46	00.00+0	129.84 47+74.87	131.25 9+63.00	131.48 9+83.00	131.97 29+83.00	132.85 30+52.00	134.08 0+16.00	134.09 0+36.00	134.75 14441.00	134.75 16+81.28	95.42 6+18.00	95.78 6+29.00	95.79 6+52.00	95.80 6+78.10	132.00 4+46.00	132.15 29+18.60
	04 STATION (FT) STATION (FT) 0+00+65	0+00.00 129.04 29+79.38	29+79.38 129.89 29+86.38	29+86,38 129,89 29+92,63	29+92,63 129,89 29+99,63	29+99.63 129.90 30+10.46	129.83 0+00.00	0+00.00 129.84 47+74.87	0+00.00 131.25 9+63.00	9+63.00 131.48 9+83.00	9+83.00 131.97 29+83.00	0+00.00 132.85 30+52.00	0+00.00 134.08 0+16.00	0+16.00 134.09 0+36.00	0+36.00 134.75 14+41.00	0+36.00 134.75 16+81.28	0+00.00 95.42 6+18.00	6+18.00 95.78 6+29.00	6+29.00 95.79 6+52.00	6+52.00 95.80 6+78.10	0+00.00 132.00 4+46.00	4+46.00 132.15 29+18.60

TABLE A-2 MDC INTERCEPTORS SOUTH SYSTEM

9 6 6 6 6 0 0 0 0 0 0												
8 RO 9 8 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	09-81-62	132.97	31+24.00	133.04	79×84	HOR SE SHOE	205.40	0.000340	37.31	.016	91.19	58.91
6.00 3	00.00.00	133.04	33+84.80	134.16	78×84	HOR SF SHOF	3384.80	0.000330	37.31	.016	91.15	58.91
BRO BRO	00.00.00	134.22	30+19.00	135.47	78×84	HORSE SHOE	3019.00	0.000414	37.31	.016	101.40	65.53
	30+19-00	135.47	30+23.00	135.23		TRANSITION	•••					
	30+23.00	135.23	30+35.00	135,23	87x65	HORSESHOE	12.00		*0.00	.016		
82 BRO 30	30+35.00	135.23	30+39.00	135.23		TRANSITION	••••					
82 BRO 30	30+39-00	135.23	48+50.00	136.08	75×78	HORSE SHOF	1811.00	0.000469	34.02	.016	95.92	66.19
83 BRO C	00.00+0	136.08	11+17.60	136.45	69×72	HORSE SHOF	1117.60	0.000331	30.88	.016	10.88	18.54
83 680 11	11+17.60	136.45	11+24.60	136.45		TRANSITION	87.00					
83 880 11	11+24.60	136.45	11+31.60	136.46	73×67	HORSESHOF	7.00	0.001428	31.68 .016	.016	151.69	97.98
83 8R0 11	11+31.60	136.46	11+38.60	136.46		TRANSITION	7.00					
83 640 11	11+38.60	136.46	16+11.00	136.62	69×72	HOR SE SHOE	472.40	0.000338	30.88 .016	910.	70.88	18.51
83 BRO 16	16+11-00	136.62	16+20.00	136.62		TRANSITION	89.00					
83 BRO 16	16+20.00	136.62	16+23.00	136.62	73X67	HORSE SHOE	3.00		31.68	.016		
83 BRO 16	16+23.00	136.62	16+35.00	136.62		TRANSITION	12.00					
83 BRO 10	16+35.00	136.62	18+16.00	136.68	99x69	HORSESHOE	181.00	0.000331	29.10 .016	910.	65.58	42.38
83 BRO 16	18+16.00	136.68	18+30.00	136.69		TRANSETION	14.00	0.000714				
83 BRO 18	18+30.00	136.69	18+52.00	136.70	99	CIRCULAR	22.00	0.000454	23.75 .016	910.	58.26	37.65
83 BRO 16	18+52.00	136.70	18+58.00	136.70		TRANSITION	86.00					
83 BRO 16	18+58.00	136.70	24+64.00	136.90	69×72	HOR SE SHOF	606.00	0.000330	30. AR .016	910.	70.88	45.81
84 BRI BRO C	00.00+0	136.90	21+68-67	137.62	69x72	HOR SE SHOE	2168.67	0.000332	30.88	910.	10.88	45.81
85 BRI (	0+00.00 137.62	137.62	63+49.79	139.74	69×72	HOR SE SHOE	6349.79	0.000333	30.88 .016	910.	70.98	18.81

TABLE A-2 MDC INTERCEPTORS SOUTH SYSTEM

SECT	707	FROM	(FT)	STATION	(FT)	Srze (IN)	SHAPE	LENGTH (FT)	SLOPE	AREA MANN	CAPACITY (CFS)	(MGD)
98	188	00.0000	139.74	5+80.00	139.93	69×72	HORSESHOE	580.00	0.000327	30.88 .016	70.13	45.32
98	BRI	5+80.00	139.93	2+90.00	139.94		TRANSITION	10.00	0.001000			
98	BRI	2+90.00	139.94	17+27.00	140.89	72×48	HORSE SHOF	1137.00	0.000835	38.14 .016	148.50	95.97
98	188	17+27.00	140.89	17+37.00	140.90		TRANSITION	10.00	0.001000			
98	188	17+37.00	140.90	24+39.00	141.13	69×72	HOR SE SHOE	702.00	0.000327	30.88 .016	70.13	45.32
18	BRI NE	0+00	141.13	19+60-00	142.28	63×66	FXT. CIRCLE	1960.00	0.000586	22.96 .016	63.40	40.97
86	WAO DED	00.00+0	178.21	00.00+0	179.98		DROP MANHOLE					
96	WRO DED	00.00+0	179.98	0+00+19	179.98		BELLMOUTH	61.6				
86	WRO DED	0+09-19	179.98	00.00.9	180.33	36×40	EXT. CIRCLE	590.81	0.000592	8.07 .015	16.82	10.87
86	WRO DED	00.00+9	180.33	6+20.00	180.34		TRANSITION	20.00	0.000500			
66	WRO DED	6+20.00	180.34	8+34.00	180.47	36×42	EXT. CIRCLE	214.00	0.000000	8.57 .015	23.60	15.25
86	WRO DED	8+34.00	180.47	8+45.00	180.48		TRANSITION	11.00	606000000			
86	WRO DED	8+45.00	180.48	11+42.00	180.66	36×40	FXT. CIPCLE	297.00	0.000606	8.07 .015	17.07	11.03
86	WRO DED	11+42.00	180.66	11+57.00	190.67		TRANSITION	15.00	0.000666			
86	WRG DED	11+57.00	180.67	20+00•00	181.03	36×42	EXT. CIRCLE	843.00	0.000427	8.57 .015	15.43	4.97
86	#RO DED	20+00,00 181,03	181.03	20+30.00	181.43	36×42	EXT. CIRCLE	30.00	0,013333	8.57 .015	86.23	55.73
86	WRO DED	20+30.00	181.43	20+10.00	181.45	36×42	EXT. CIRCLE	*0.00	0.000500	8.57 .015	16.70	10.70
86	WRO DED	20+70.00	181.45	20+81.00	181.70		TRANSITION	11.00	0.022727			
86	WRO DED	20+91 .00	181.70	33+50.00	182.45	34X39	EXT. CIRCLE	1269.00	0.000591	210. 64.7	15.19	9.82
66	DED	00.00.0	182.45	0+12.50	162.46		TRANSITION	12.50	0.000000			
06	DED	0+12.50	182.46	25+34.11	183.94	33×36	EXT. CIRCLE	2521.60	0.000586	6.63 .015	12.83	8.29
66	DEO	25+34.11 183.94	183.94	26+56.07	1 64.06	30	CIRCULAR	121.96	0.000943	4.91 .015	11.16	7.21

TABLE A-2 MDC INTERCEPTORS SOUTH SYSTEM

DED   10.00	SECT	707	STATION	(FT)	STATION	INVERT (FT)	SIZE (IN)	SHAPE	LENGTH (FT)	St. OPE	(SOFT)	Z Z Z	CAPACITY (CFS) (	(MGD)
PED         CONDOING         1884-13         19421.05         186-72         33336         EXT. CIRCLE         3921.05         0.00056M         6.643.015         12.83           PED MED         360-20         186-72         36-21.00         186-85         31336         EXT. CIRCLE         1821.00         0.00056M         6.64.01.015         12.83           PED MED         37-70-00         189-80         37-77-00         189-80         27-70         EXT. CIRCLE         6.00056M         4.54.015         7.09           PED MED         37-70-00         189-80         37-77-00         189-80         27-70         EXT. CIRCLE         6.00056M         4.54.015         7.09           NED         0.000-00         189-80         199-12         29-17-21         199-12         27-70         EXT. CIRCLE         6.00066M         4.54.015         7.09           NED         0.000-00         199-12         199-12         29-17-21         199-12         27-70         EXT. CIRCLE         5.91-00         7.09         7.09         7.09           NED         0.000-00         199-12         199-12         27-70         EXT. CIRCLE         5.91-70         7.00         7.09         7.09         7.09         7.00         7.00	:	0€0	26+56.07		32+99.05	184.43	33836	EXT. CIRCLE	642.98	0.000575	6.63 .	510	12.68	8.19
MED         MED <td>1 00</td> <td>050</td> <td>00.00.0</td> <td>184.43</td> <td>39+21.05</td> <td>186.72</td> <td>33X36</td> <td>EXT. CIRCLE</td> <td>3921.05</td> <td>0.000584</td> <td>6.63</td> <td>510</td> <td>12.83</td> <td>8.29</td>	1 00	050	00.00.0	184.43	39+21.05	186.72	33X36	EXT. CIRCLE	3921.05	0.000584	6.63	510	12.83	8.29
VED         NET         STATE         STA		DED NED		186.72	36+21.00	188.85	33×36	EXT. CIRCLE	3621.00	0.000588		510	12.83	8.29
NED         377,70.0         189.80         38430,14         189.84         27X30         EXT. CIRCLE         641.14         0.000654         4.54,015         9.16           NED         0.000.0         189.86         36445,43         194.12         24X27         EXT. CIRCLE         645.63         0.000623         4.54,015         7.98           NED         0.000.00         194.12         64450.66         194.12         24X27         EXT. CIRCLE         591.791         0.000623         3.64,015         7.98           NED         0.000.00         194.12         59415.91         197.82         24X27         EXT. CIRCLE         591.791         0.000623         3.64,015         5.95           NED         0.000.00         194.62         24X27         EXT. CIRCLE         591.791         0.000623         3.64,015         5.95           NED         0.000.00         197.82         24X27         EXT. CIRCLE         591.791         3.64,015         5.95           NED         0.000.00         199.28         24X27         EXT. CIRCLE         591.791         3.64,015         5.95           NED         0.000.00         199.28         24X27         EXT. CIRCLE         130.00         3.94         3.94	-	DED NED		188.85	37+79.00	189.80	2-16	SIPHON	154.00	0.006012	2.79 .	510	8.88	5.74
NED         0.000.00         140.645         6845.643         194.12         27.33         EXT. CIRCLE         6845.683         0.0006.23         4.54.015         7.98           NED         6845.631         194.12         24.27         EXT. CIRCLE         .43         3.64.015         7.98           NED         0.000.00         194.12         24.27         EXT. CIRCLE         .917.91         0.0006.25         3.64.015         5.95           NED         0.000.00         197.82         197.82         24.27         EXT. CIRCLE         317.91         0.0006.25         3.64.015         5.95           NED         0.000.00         197.82         197.82         24.27         EXT. CIRCLE         317.91         0.0006.25         3.64.015         5.95           NED         0.000.00         197.82         24.27         EXT. CIRCLE         170.00         0.0006.25         3.64.015         5.95           NED         27.20.00         199.21         24.27         EXT. CIRCLE         170.00         0.0006.25         5.31.015         5.95           NED         27.20.00         199.21         24.27         EXT. CIRCLE         170.00         0.0006.20         3.11.015         5.95           NED         20		DED NED		189.80	38+43.14	189.84	27×30	EXT. CIRCLE	61.14	0.000654		910	8.16	5.27
NED   08495.01   194.12   08450.16   194.12   24X27   EXT. CIPCLE   .52   3.64 .015   5.95     NED   0.000.00   194.12   59417.91   197.42   24X27   EXT. CIPCLE   1329.00   0.000625   3.64 .015   5.95     NED   0.000.00   194.12   59417.91   197.42   24X27   EXT. CIPCLE   1329.00   0.000626   3.64 .015   5.95     NED   0.000.00   194.12   27420.00   199.65   24X27   EXT. CIPCLE   1329.00   0.000626   3.64 .015   5.95     NED   0.000.00   194.12   0.0006   0.00062   0.00062   0.00062   0.00062   0.00062     NED   0.000.00   199.62   0.0006   0.00062   0.00062   0.00062   0.00062   0.00062   0.00062     NED   0.000.00   0.0007   0.0007   0.0007   0.0007   0.00062   0.00062   0.00062   0.00062   0.00062   0.00062     NED   0.000.00   0.0007   0.0007   0.0007   0.0007   0.00062	25	NED	00.00.00	189.85	68+45.93	194.12	27×30	EXT. CIRCLE	6845.83	0.000623		910	7.98	5.16
NED         08+50.16         194.12         68+50.46         194.12         24x27         FYT. CIRCLE         .452         31.64         010         31.64         015         5.95           NED         0.000.00         194.12         59417.91         197.82         24x27         FXT. CIRCLE         1329.00         0.000625         3.64         015         5.95           NED         1329.00         196.65         24x27         FXT. CIRCLE         1329.00         0.000622         3.64         015         5.95           NED         27x20.00         199.65         24x27         FXT. CIRCLE         1329.00         0.000622         3.64         015         5.95           NED         27x20.00         199.65         24x27         FXT. CIRCLE         170,00         0.000622         3.14         0.00         9.77         0.00         9.77         0.00         9.77         0.00         9.77         0.00         9.77         0.00         9.77         0.00         9.77         0.00         9.77         0.00         9.77         0.00         9.77         0.00         9.77         0.00         9.77         0.00         9.77         0.00         9.77         0.00         9.77         0.00 <td< td=""><td>20</td><td>NED</td><td>68+45-83</td><td>194.12</td><td>91.05+89</td><td>194.12</td><td></td><td>TRANSITION</td><td>4.33</td><td></td><td></td><td></td><td></td><td></td></td<>	20	NED	68+45-83	194.12	91.05+89	194.12		TRANSITION	4.33					
NED         0+000+00         194-12         59417*91         197-42         24x27         EXT. CIPCLE         5917*91         0+000624         3.64 + 015         5.95           NED         13+29+00         197-82         13+29+00         194-65         24x27         EXT. CIPCLE         1329+00         0+000624         3.64 + 015         5.95           NED         20+20+00         199-68         27x20         199-68         27x20         CATEMARY         591-00         0+000626         5.31 + 015         5.95           NED         27+20+00         199-71         27x36         CATEMARY         314-00         0+000626         5.31 + 015         5.95           NED         20+34+00         199-71         27x36         CATEMARY         314-00         0+000626         5.31 + 015         5.95           NED         20+34+00         199-71         27x36         EXT. CIRCLE         1266-57         0+000626         5.31 + 015         5.95           NED         20+34+00         29-427         EXT. CIRCLE         1266-57         0+000626         3-34 + 015         5.95           NED         20+34-00         29-427         EXT. CIRCLE         4425-20         3-34 + 015         3-34 + 015         3-34	05	NED	68+50.16	194.12	89+20-68	194.12	24×27	FXT. CIRCLE	.52		3.64 .	015	5.05	3.85
NED         13+29-00         193-65         24x27         EXT. CIPCLE         1329-00         0.000622         5.54         5.95           NED         13+29-00         199-08         27x36         CATENARY         691-00         0.000622         5.31         015         9.89           NED         20+20-00         199-08         27x36         CATENARY         314-00         0.000622         3.64         0.15         9.89           NED         27+20-00         199-21         27x30         199-21         27x36         CATENARY         314-00         0.000625         3.54         0.15         9.89           NED         27+20-00         199-21         27x36         CATENARY         314-00         0.000625         3.54         0.15         9.89           NED         30+34-00         199-21         27x20         24x27         EXT. CIRCLE         700-05         3.54         0.15         9.89           NED         0+000-00         20-32         24x27         EXT. CIRCLE         7425-20         0+000625         3.54         0.15         5.95           MIN         0+000-00         127-10         33+55-00         206-00         24x27         EXT. CIRCLE         7450-05         0+0000-00	03	NED	00.00.0	194.12	16.71+65	197.92	24 X27	EXT. CIRCLE	5917.91	0.000625	3.64	510	5.95	3.85
NED         13+29-0.0         196.65         20+20.0         199.08         27x36         CATENARY         691.00         0.000622         5.31.015         9.88           NED         27+20.00         199.68         27+20.00         199.62         24x27         EXT. CIRCLE         700.02         3.64.015         5.95           NED         30+34.00         199.62         24x27         EXT. CIRCLE         1266.57         0.00065         5.31.015         9.77           NED         0+000.00         200.51         44+25.20         201.28         24x27         EXT. CIRCLE         4425.20         3.64.015         5.95           NED         0+000.00         203.28         44+25.20         201.28         24x27         EXT. CIRCLE         4425.20         3.64.015         5.95           NED         0+000.00         127.10         35+68.31         126.53         24x27         EXT. CIRCLE         4455.00         0.00062         3.64.015         5.95           MIN         0+000.00         127.10         35+68.31         126.53         72x75         EXT. CIRCLE         4450.45         3.64.015         73.99         4           MIN         0+000.00         127.79         131.60         133.09         72x75 <td>*</td> <td>NED</td> <td>00.00.00</td> <td>197.82</td> <td>13+29.00</td> <td>198.65</td> <td>24×27</td> <td>EXT. CIPCLE</td> <td>1329.00</td> <td>0.000624</td> <td></td> <td>510</td> <td>5.95</td> <td>3.85</td>	*	NED	00.00.00	197.82	13+29.00	198.65	24×27	EXT. CIPCLE	1329.00	0.000624		510	5.95	3.85
NED         20+20-00         199-08         27+20-00         199-10         27+20-00         199-10         27+20-00         199-10         27+20-00         199-20         24x27         EXT. CIRCLE         700-00         5-31 .015         9-72         9-72           NED         30+34-00         199-71         49-52         20-51         49-25-20         24x27         EXT. CIRCLE         1266-57         0.000625         5-31 .015         5-95           NED         0+000-00         200-51         44+25-20         203-28         EXT. CIRCLE         4425-00         0.000626         3.64 .015         5-95           NED         0+000-00         203-28         43+55-00         206-00         24x27         EXT. CIRCLE         4355-00         3.64 .015         5-95           MTN         0+000-00         127-10         35-68.33         128-53         0.000626         3.76 .015         5-95           MTN         0+000-00         127-10         35-68.33         128-53         0.000626         3.76 .015         73-99         4           MTN         0+000-00         127-10         35-68.33         128-53         0.000626         3.77 .016         73-99         4           MTN         0+000-00         131-8	•	NED	13+29.00	198.65	20+20-00	199.08	27X36	CATENARY	691.00	0.000622		510	9.88	6.39
NED         27+20.00         199-52         30+34.00         199-71         27X36         CAFENARY         314.00         0.000605         5.31 .015         9.72           NED         30+34.00         199-71         43+25.20         200.51         24X27         EXT. CIRCLE         1266.57         0.000625         3.64 .015         5.95           NED         0+000.00         200.51         44+25.20         204.27         EXT. CIRCLE         4355.00         3.64 .015         5.95           NED         0+000.00         203.28         43+55.00         266.00         24X27         EXT. CIRCLE         4355.00         3.64 .015         5.95           MIN         0+000.00         127.10         35+68.31         128.53         72X75         EXT. CIRCLE         4356.00         29.77 .016         73.99         4           MIN         0+000.00         130.04         44+50.54         131.42         72X75         EXT. CIRCLE         4450.56         0.000400         29.77 .016         73.99         4           MIN         0+000.00         131.02         31+77.00         133.09         72X75         EXT. CIRCLE         4450.56         0.000400         29.77 .016         73.99         4           MIN		NED	20+50.00	199.08	27+20.00	199.52	24 X27	EXT. CIPCLE	200.002	0.000020		510		3.05
NED         30+34-00         199.71         44+25.20         200.51         24x27         EXT. CIRCLE         1266.57         0.000625         3.64.015         5.95           NED         0+000.00         200.51         44+25.20         201.28         24x27         EXT. CIRCLE         4425.20         0.000625         3.64.015         5.95           NED         WEL         0+000.00         127.10         35+68.31         128.65         72x75         EXT. CIRCLE         3568.33         0.000626         3.64.015         5.95           MTN         0+000.00         128.53         37+79.80         130.04         72x75         EXT. CIRCLE         3768.33         0.000399         29.77.016         73.99         4           MTN         0+000.00         130.04         44+50.54         131.42         72x75         EXT. CIRCLE         4450.54         0.000399         29.77.016         73.99         4           MTN         0+000.00         131.82         31+70.00         133.09         72x75         EXT. CIRCLE         4450.54         0.000399         29.77.016         73.99         4           MTN         0+000.00         131.80.49         133.09         133.00         133.09         133.00         133.09 <td< td=""><td></td><td>NED</td><td>27+20.00</td><td>199.52</td><td>30+34.00</td><td>17.661</td><td>27X36</td><td>CATFNARY</td><td>314.00</td><td>0.000605</td><td>5.31</td><td>510</td><td>9.72</td><td>6.28</td></td<>		NED	27+20.00	199.52	30+34.00	17.661	27X36	CATFNARY	314.00	0.000605	5.31	510	9.72	6.28
NED         0+00-00         200.51         44+25.20         203.28         24x27         EXT. CIRCLE         4425.20         0.000625         3.64.015         5.95           NED         0+00.00         203.28         43+55.00         206.00         24x27         EXT. CIRCLE         4355.00         0.000626         3.64.015         5.95           MTN         0+000.00         127.10         35+68.33         128.53         72x75         EXT. CIRCLE         3568.33         0.000400         29.77.016         73.99         4           MTN         0+000.00         120.04         44+50.54         131.92         72x75         EXT. CIRCLE         4450.54         0.000399         29.77.016         73.99         4           MTN         0+000.00         131.82         131.92         72x75         EXT. CIRCLE         4450.54         0.000399         29.77.016         73.99         4           MTN         0+000.00         131.82         31+77.00         133.09         72x75         EXT. CIRCLE         3170.00         29.77.016         73.99         4           MTN         31+77.00         133.09         31+77.00         133.09         54x60         EXT. CIRCLE         3160.00         29.77         1016         73.9		NED	30+34.00	14.661	43+00.57	200.51	24X27	EXT. CIRCLE	1266.57	0.000631	3.64 .	015	5.95	3.85
NED WEL         0+000.00         203.28         43+55.00         26.00         24x27         EXT. CIRCLE         4355.00         0.000624         3.64.015         5.95           MIN         0+000.00         127.10         35+68.33         128.53         72x75         EXT. CIRCLE         3569.33         0.000400         29.77 .016         73.99         4           MIN         0+000.00         128.53         37+79.80         130.04         72x75         EXT. CIRCLE         4450.54         0.000399         29.77 .016         73.99         4           MIN         0+000.00         131.82         31+70.00         133.09         72x75         EXT. CIRCLE         3170.00         29.77 .016         73.99         4           MIN         31+70.00         133.09         72x75         EXT. CIRCLE         3170.00         29.77 .016         73.99         4           MIN         31+70.00         133.09         133.09         54x60         EXT. CIRCLE         3160.00         29.77 .016         73.99         4	95	NED	00.00.0	200.51		201.28	24×27	EXT. CIRCLE	4425.20	0.000625	3.64	015	5.95	3.85
MTN         0+000.00         127.10         35-68.31         128.53         72x75         FXT, CIRCLE         35-68.33         0.000400         29.77 .016         73.99           MTN         0+000.00         128.53         37+79.80         130.04         72x75         FXT, CIRCLE         3778.80         0.000399         29.77 .016         73.99           MTN         0+00.00         131.82         31+70.00         133.09         133.09         72x75         EXT, CIRCLE         3170.00         0.000400         29.77 .016         73.99           MTN         31+70.00         133.09         133.09         133.09         133.09         54x60         EXT, CIRCLE         3.48         18.15	90	NED WEL				2 06 • 00	24×27	EXT. CIRCLE	4355.00	0.000624	3.64 .	910	5.05	3.85
MTN         0+000.00         128.53         37+79.80         130.04         72×75         EXT, CIRCLE         3778.80         0.000399         29.77 .016         73.99           MTN         0+000.00         131.02         31+70.00         133.09         133.09         133.09         31+77.00         133.09         54×60         EXT, CIRCLE         31-48         7.00         7.00         7.00         7.00           MTN         31+77.00         133.09         31+77.00         133.09         133.09         54×60         EXT, CIRCLE         3.48         18.15	10	2	00.00.0	127.10		128.53	72×75	EXT. CIRCLE	3568.33	0.000000	29.77 .	910	13.99	47.82
MTN         0+000.00         131.82         31.70.00         131.82         31.70.00         133.09         72x75         EXT. CIRCLE         3170.00         9.000400         29.77 .016         73.99           MTN         31+70.00         133.09         133.09         133.09         133.09         54x60         EXT. CIRCLE         3148         18.15	80	2 2	00.00.0	128.53		130.04	72×75	EXT, CIRCLE	3778.80	0.000399	29.77 .	910	73.99	47.82
MTN         0+00.00         131.82         31+70.00         133.09         72x75         EXT. CIRCLE         3170.00         0.000400         29.77 .016         73.99           MIN         31+77.00         133.09         31+80.48         133.09         54x60         EXT. CIRCLE         3.48         18.15         .016	601	2 2	00.00.00	130.04	44+50.54	131.92	72×75	EXT. CIRCLE	4450.54	0.000399	29.77 .	910	73.99	47.82
MIN 31+77.00 133.09 31+77.00 133.09 6FLLMOUTH 7.00 18.15	0	2 2	00.00+0	131.82	31+70.00	133.09	72×75	EXT. CIRCLE	31 70.90	0.000000	29.77 .	910	73.99	47.82
MTN 31+77.00 133.09 31+80.48 133.09 54X60 EXT. CIRCLE 3.48 18.15	110	2 7 2	31+70-00		31+77.00	133.09		BELLMOUTH	7.00		18.15			
	01	M TA	31+77.00		31+80.48	133.09	24 x60	EXT. CIRCLE	3.48			910		

TABLE A-2 MDC INTERCEPTORS SOUTH SYSTEM

77.			STATION	(FT)	CIN		(FT)	St Ore	(SOFT)	ZZZ	(CFS) (	(MGD)
NY NIE	00*00+0	133.09	56+00-79	134.96	54 x60	EXT. CIRCLE	5600.79	0.000333	18.15	910.	34.95	22.59
112 CAN	00.00+0	134.96	55+99.50	136.86	54 x 60	EXT. CIRCLE	5599.50	0.000339	18.15	910.	34.95	22.59
113 CAN	00.00.00	136.86	12+56.00	137.28	54×60	EXT. CIRCLE	1258.00	0.000333	18.15	910.	34.95	22.59
113 CAN	12+58.00	137.28	12+61.00	137.28		TRANSITION	3.00					
113 CAN	12+61.00	137.28	12+75.00	137.28	**	CIRCULAR	14.00		12.57	910.		
113 CAN	12+75.00	137.28	12+78.00	137.29		TRANSITION	3.00	0.003333				
113 CAN	12+78.00	137.29	46+47.00	138.41	54 x60	EXT. CIRCLE	3369.00	0.000332	18.15	910.	34.95	22.59
113 CAN	46.47.00	138.41	46+52.30	138.41		TRANSITION	5.30					
113 CAN	46+52.30	136.41	46+65.70	138.41		CIRCULAR	13.40		12.57	.016		
113 CAN	46+65.70	136.41	46+71.00	138.42		TRANSITION	5.30	0.001886				
113 CAN	46+71.00	138.42	53+00-65	138.72	54 x60	EXT. CIRCLE	629.65	0.000476	18.15	910.	41.72	26.96
114 CAN	00.00+0	136.61	58+00•00	140.74	54 x60	FXT. CIRCLE	5800.00	0.000332	18.15	910.	34.95	22.59
115 CAN	00.00+0	140.74	43+31.23	142.18	54 x60	EXT. CIRCLE	4331.23	0.000332	18.15	.016	34.95	22.59
115 CAN	43+31.23	142.18	43445.23	142.50		BELLMOUTH	14.00	0.022857				
115 CAN	43+45-23	142.50	60+49.50	143.64	33×36	EXT. CIRCLE	1704.27	0.000668	6.63 .016	910.	12.93	8.36
116 CAN NOR	00.00+0	142.19	7+99.00	142.51	48X51	EXT. CIRCLE	799.00	0.0000.0	13.57	910.	25.97	16.78
116 CAN NOR	1+99.00	142.51	8**8*00	133.00	36	SIPHON	***		7.07	910.	25.03	16.18
116 CAN NOR	8+48.00	133.00	8+97.00	143.01	36	NOHAIS	***		7.07	910.	25.03	16.18
116 CAN NOR	00-16-00	143.01	52+00.92	144.73	54	CIRCULAR	4303.92	0.000399	15.90	910.	32.02	20.69
117 NOR	0+00-00	144.73	15+31.00	145.34	90	CIRCULAR	1531.00	0.000398	15.90	910.	25.97	16.78
117 NOR	15+31.00	145.34	15+69.00	135.50	36	NOHAIS	38.00		7.07	.016	27.76	17.94
117 NOR	15+69.00	135.50	16+08.00	145.90	36	SIPHON	39.00		7.07 .016	910.	27.75	17.94

TABLE A-2 MDC INTERCEPTORS SOUTH SYSTEM

\$ g	رور	FROM	(FT.)	T0 STAT10N	INVERT (FT)	S12E (1N)	SHAPE	LENGTH (FT)	SL OPE	ARFA (SOFT)	Z Z	CAPACITY (CFS)	(MGD)
117	NOR	16+08-00	145.90	57+33.00	147.49	48X51	FXT. CIRCLE	4125.00	0.000385	13.57	910.	25.48	16.47
117	NON	57+33.00	147.49	57+37.00	148.50		TRANSITION	•••	0.002500				
118	NOR WLP	00.00+0	148.50	00.00.00	151.53	36X39	FXT. CIRCLE	40.00	0.075750	7.82	910.	171.60	110.90
118	NOR WLP	00.00.00	151.53	17+10.00	153.20	36×39	EXT. CIRCLE	1670.00	0.0010000	7.82 .016	910.	19.72	12.74
118	NOR MLP	17+10-00	153.20	17+40.00	156.68		TRANSITION	30.00	0.116000				
118	NOR MLP	17+40.00	156.68	20+59.00	157.00	30×33	FXT. CIRCLE	289.00	0.001107	5.53	910.	13.13	8.49
118	NOR WLP	20+59-00	157.00	20+48.00	159.45	30×33	FXT. CIRCLE	19.00	0.076315	5.53 .016	910.	108.80	70.32
9 .	NOR WLP	20 • 68 • 00	158.45	45+06-00	161.34	30×33	EXT. CIRCLE	2458.00	0.001175	5.53 .016	910.	13.50	8.72
118	NOR WLP	*5*06.00	161.34	45+78.00	170.61	30×33	EXT. CIRCLE	72.00	0.128750	5.53	910.	141.30	91.32
118	NOR WEP	45+78.00 170.61	170.61	49+30-30	171.00	30×33	EXT. CIRCLE	352.30	0.001107	5.53	910.	13.13	
119	CAN	00.00.0	143.64	32+16-07	145.78	33×36	EXT. CIRCLE	3216.07	0.000665	6.63 .016	910.	12.93	8.36
119	CAN	32+16-07	145.78	32+64.31	145.99	30	CIRCULAR	48.24	0.004145	4.91 .016	910.	21.48	13.88
611	CAN	32+64.31	145.98	35+70.00	157.73	24 X2 T	EXT. CIRCLE	306.69	0.038312	3.64 .016	.016	43.71	28.25
611	CAN	35+70.00	157.73	35+80.26	158.14	24 X2 7	EXT. CIRCLE	10.26	0.039961	3.64 .016	910.	44.64	28.85
120	CAN	00.00+0	158.14	12+07-00	162.17	27×36	EXT. CIRCLE	1207.90	0.003338	5.67 .016	910.	23.44	15.15
120	CAN	12+07-00	162.17	22+04-80	176.43	27x36	EXT. CIRCLE	1997.80	0.007137	5.67	910.	34.29	22.16
120	CAN	22+04.80	176.43	33+02-00	191.90	27×36	EXT. CIRCLE	1097.20	0.004985	5.67	910.	28.66	18.52
121	CAN	00.00.0	181.90	12+90.00	188.34	27X36	EXT. CIRCLE	1290.00	0.004992	2.67	.016	28.70	18.55
121	CAN	12+90.00	198.34	12+30.00	189.69		DROP MANHOLE						
121	CAN	12+90.00	189.69	15+50.00	193.87	50	CIRCULAR	260.00	0.016076	2.18 .015	\$10.	14.43	9.33
121	CAN	15+50.00	193.87	32+12.00	200.51	20	CIRCULAR	1662.00	0.003995	2.18	\$10.	7.68	96.4
121	CAN	32+12.00	200.51	54+47.00	206.89	20	CIRCULAR	2235.00	0.002854	2.18	.015	6.49	4.19

TABLE A-2 MDC INTERCEPTORS SOUTH SYSTEM

96.683 28+53.00 96.633 EXT. CIRCLE 2853.00 0.000623 20.99 0.10 57.66 96.63 EXT. CIRCLE 2853.00 0.000623 20.99 0.10 57.66 96.63 EXT. CIRCLE 2863.58 0.000623 20.99 0.10 57.66 96.63 EXT. CIRCLE 2863.58 0.000623 18.91 0.10 50.61 96.63 99.50 99.		INVERT (FT)	STATION	INVERT (FT)	SI ZE (IN)	SHAPE	LENGTH (FT)	SLOPE	(SOFT)	Z Z Z	CAPACITY (CFS) (	(MGD)
28.453.00         90.683         EXT. CIRCLE         28.53.00         0.000633         20.89 .016         57.66           28.465.00         96.84         IRANSITION         12.00         0.000633         18.91 .016         57.66           55428.5         96.56         57.60         EXT. CIRCLE         2664.50         0.000623         18.91 .016         50.51           4.786.0         57.60         A8         SIPHON         431.00         12.57 .016         35.49           114.00.00         59.00         A8         SIPHON         431.00         12.57 .016         35.49           114.00.00         59.00         A8         SIPHON         431.00         12.57 .016         35.49           114.00.00         59.00         A8         SIPHON         431.00         12.57 .016         35.49           114.00.00         10.20         57.60         EXT. CIRCLE         9.00         12.57 .016         35.49           114.00.00         10.22         57.60         EXT. CIRCLE         9.00         18.91 .016         25.31           5448.50.00         10.22         57.60         EXT. CIRCLE         9.00         18.91 .016         25.31           5449.00         10.22         42         SI		206.89	54+81.67	211.30	20	CIRCULAR	34.67	0.112777		510.	40.78	26.36
28+65.00         96.84         TRANSITION         12.00         0.000623         18.91         O.00           55428.58         98.50         57X60         EXT. CIRCLE         266.358         0.000623         18.91         O.01           5544.00         89.00         48         SIPHON         114.00         12.57         O.16         35.49           11+09.00         59.00         48         SIPHON         411.00         12.57         O.16         35.49           11+09.00         59.00         48         SIPHON         411.00         12.57         O.16         35.49           11+09.00         59.00         48         SIPHON         411.00         12.57         O.16         35.49           11+4.00         100.00         57X60         EXT. CIRCLE         9.00         12.57         O.16         40.41           30+48.00         100.00         57X60         EXT. CIRCLE         30.40         9.62         O.16         25.31           30+48.00         90.75         42         SIPHON         114.00         9.62         O.16         25.31           29+90.00         103.25         50         CIRCULAR         134.00         9.62         O.16         25.31		95.05	28+53.00	96.83	60×63	EXT. CIRCLE	2853.00	0.000623		•016	57.66	37.26
5564.00         48         STRÓN         EXT. CIRCLE         2663.86         0.0000623         18.91         0.05           5564.00         89.00         48         SIBHON         564.00         12.57         016         35.49           64.78.00         59.00         48         SIBHON         114.00         12.57         016         35.49           114.00         59.00         48         SIBHON         517.00         12.57         016         35.49           114.00         59.00         48         SIBHON         517.00         12.57         016         35.49           164.26.00         100.00         48         SIBHON         517.00         12.57         016         35.49           30+48.00         100.00         57X60         FXT. CIRCLE         30.40         35.40         40.41         40.41         40.41           30+83.00         90.75         42         SIPHON         114.00         9.62         016         25.31           15+62.00         90.75         42         SIPHON         114.00         9.62         016         25.31           25+62.00         90.75         42         SIPHON         114.00         9.62         016 <t< td=""><td></td><td>96.83</td><td>28+65.00</td><td>96.84</td><td></td><td>TRANSITION</td><td>12.00</td><td>0.000833</td><td>•</td><td></td><td></td><td></td></t<>		96.83	28+65.00	96.84		TRANSITION	12.00	0.000833	•			
99.50         \$46.00         \$48         \$1PHON         \$64.00         \$12.57         \$10.50         \$35.49           99.70         6478.00         \$9.00         \$49         \$1PHON         \$114.00         \$12.57         \$10.6         \$35.49           \$9.00         \$11.00         \$49         \$1PHON         \$114.00         \$12.57         \$10.6         \$35.49           \$9.00         \$11.00         \$20.00         \$48         \$1PHON         \$31.00         \$12.57         \$10.6         \$35.49           \$9.00         \$10.00         \$20.00         \$48         \$1PHON         \$31.00         \$12.57         \$10.6         \$35.40           \$100.00         \$10.00         \$27.00         \$27.00         \$27.00         \$10.0		96.84	55+28.58	98.50	57×60	EXT. CIRCLE	2663.58	0.000623	18.91	910.	50.51	₩.64
699.00         6478.00         699.00         448         STPHON         114.00         12.57.016         35.49           599.00         114.09         59.00         48         STPHON         431.00         12.57.016         35.49           599.00         16426.00         100.00         57X60         EXT. CIRCLE         9.00         12.57.016         35.49           100.00         16426.00         100.00         57X60         EXT. CIRCLE         9.00         12.57.016         35.49           100.00         101.22         57X60         EXT. CIRCLE         9.00         10.91		98.50	5+64.00	89.00	84	SIPHON	564.00			910.	35.49	22.49
59.00         11+090.00         59.00         48         SIPHON         431.00         12.57 .016         35.49           59.00         16+24.00         1 Co.00         48         SIPHON         517.00         12.57 .016         35.49           100.00         57X60         EXT. CIRCLE         9.00         18.91 .016         40.41           100.00         30.48.00         101.22         57X60         EXT. CIRCLE         30.00         18.91 .016         40.41           100.00         30.48.00         90.50         42         SIPHON         35.00         9.62 .016         25.31           90.75         7400.00         90.75         42         SIPHON         114.00         9.62 .016         25.31           90.75         7400.00         102.72         42         SIPHON         114.00         9.62 .016         25.31           102.72         42         SIPHON         112.00         9.62 .016         25.31           103.25         90.00         79.40         31.00         9.62 .016         25.31           103.25         103.25         50         CIRCULAR         112.00         9.62 .016         25.31           103.26         104.60         79.40         79.40<		89.00	6+78.00	29.00	4.8	SIPHON	114.00			910.	35.49	22.94
59.00         16+26.00         100.00         48         SIPHON         517.00         12.57 .016         35.49           100.00         16+35.00         100.00         57X60         EXT. CIRCLE         9.00         18.91 .016         40.41           100.00         30+48.00         101.22         57X60         EXT. CIRCLE         9.00         18.91 .016         40.41           100.22         30+48.00         90.75         42         SIPHON         35.00         9.62 .016         25.31           90.75         7+09.00         90.75         42         SIPHON         114.00         9.62 .016         25.31           90.75         150.00         90.75         42         SIPHON         114.00         9.62 .016         25.31           102.72         28+78.00         103.25         5         CIRCULAR         115.00         9.62 .016         25.31           103.25         29+90.00         79.40         30         SIPHON         112.00         9.62 .016         25.31           103.25         29+90.00         79.40         30         SIPHON         112.00         4.91 .015         12.80           103.45         354.26.82         107.53         48         CIRCULAR <td< td=""><td></td><td>29.00</td><td>11+09.00</td><td>29.00</td><td>4</td><td>SIPHON</td><td>431.00</td><td></td><td></td><td>910.</td><td>35.49</td><td>22.94</td></td<>		29.00	11+09.00	29.00	4	SIPHON	431.00			910.	35.49	22.94
100.00         16435.00         100.00         57X60         FXT. CIRCLE         9.00         18.91         .016           100.00         30+48.00         101.22         57X60         FXT. CIRCLE         304.00         0.000400         16.91         .016         40.41           101.22         30+48.00         101.22         57X60         FXT. CIRCLE         304.00         9.00         10.00         9.00		29.00	16+26.00	1 00.00	8	SIPHON	517.00			.016	35.49	22.94
100.00         30+48.00         101.22         57x60         FXT. CIRCLE         3048.00         16.91.016         40.41           101.22         30+83.00         99-50         42         SIPHON         35.00         9.62.016         25.31           99.50         5+95.00         90.75         42         SIPHON         114.00         9.62.016         25.31           90.75         7+09.00         90.75         42         SIPHON         114.00         9.62.016         25.31           102.72         28+78.00         103.25         50         CIRCULAR         1316.00         9.62.016         25.31           103.25         29+90.00         79.40         30         SIPHON         112.00         13.64.015         27.86           103.25         29+90.00         79.40         30         SIPHON         112.00         4.91.015         12.80           79.40         36+22.00         104.50         3         SIPHON         292.00         4.91.015         12.80           107.53         53+86.65         66.00         2-18         SIPHON         19.63         3.53 .015         35.39           96.00         53+86.65         96.00         2-18         SIPHON         19.63		100.001	16+35.00	100.00	57X60	EXT. CIRCLE	00.6			910.		
101.22         30+83.00         99-50         42         SIPHON         35.00         9.62         .016         25.31           99-50         5+95.00         90.75         42         SIPHON         114.00         9.62         .016         25.31           90.75         7+09.00         90.75         42         SIPHON         114.00         9.62         .016         25.31           102.72         25-70         42         SIPHON         114.00         9.62         .016         25.31           102.72         29+70.00         103.25         50         CIRCULAR         1316.00         9.62         .016         25.31           103.25         29+90.00         79-40         30         SIPHON         112.00         4.91         .015         12.80           79-40         354-22.00         1C4-50         30         SIPHON         292.00         4.91         .015         12.80           107-53         510-60         2-18         SIPHON         19.83         3.53         .015         34.59           96-00         53+81-73         96-00         2-18         SIPHON         19.83         3.98         .016         35.39         35.39	00.00+0	100.00	30+48.00	101.22	57×60	FXT. CIRCLE	3048.00	0.000400		910.	14.04	26.12
99-50         5+95.00         90.75         42         SIPHON         595.00         9-62 .016         25.31           90.75         7+09+00         90.75         42         SIPHON         114.00         9-62 .016         25.31           90.75         15+62+00         102.72         42         SIPHON         1114.00         9-62 .016         25.31           102.72         28+78+00         103.25         50         CIRCULAR         1316.00         9-62 .016         25.31           103.25         29+90+00         79+40         30         CIRCULAR         112.00         4-91 .015         12.80           79+40         33+30+00         79+40         30         SIPHON         340+00         4-91 .015         12.80           79+40         35+22-00         164-50         30         SIPHON         292.00         4-91 .015         12.80           103-42         53+28-85         107-53         4-8         CIRCULAR         5328-82         0.000771         12.57 .015         34.59           107-53         53+88-85         107-53         4-9         101-015         35.39         35.39         35.39         35.39           96-00         53+81-73         108-78         108-7	30+48.00	101.22	30+83.00	99.50	45	NOHAIS	35.00			910.	25.31	16.36
90.75         7+09+00         90.75         42         SIPHON         114+00         9-62 -016         25-31           90.75         15+62.00         102.72         42         SIPHON         853.00         9-62 -016         25-31           102.72         28+78.00         103.25         50         CIRCULAR         1316.00         0.000402         13.64 .015         27.88           103.25         29+90.00         79.40         30         SIPHON         112.00         4.91 .015         12.80           79.40         35+20.00         79.40         30         SIPHON         292.00         4.91 .015         12.80           103.42         53+28.82         107.53         48         CIRCULAR         5328.82         0.000771         12.57 .015         34.59           103.42         53+28.82         107.53         48         CIRCULAR         5328.82         0.000771         12.57 .015         35.39           107.53         53+88.65         96.00         2-18         SIPHON         19.83         3.59 .015         35.39           96.00         54+00.82         108.78         27         SIPHON         19.09         3.98 .015         35.39	00.00.0	05.66	2+95.00	90.75	45	SIPHON	595.00			910.	25.31	16.36
90.75         15+62.00         102.72         42         SIPHON         853.00         9.62 .016         25.31           102.72         28+78.00         103.25         50         CIRCULAR         1316.00         0.000402         13.64 .015         27.88           103.25         29+90.00         79.40         30         SIPHON         112.00         4.91 .015         12.80           79.40         35+22.00         104.50         30         SIPHON         292.00         4.91 .015         12.80           103.42         53+28.82         107.53         48         CIRCULAR         5328.82         0.000771         12.57 .015         34.59           107.53         53+88.65         96.00         2-18         SIPHON         19.83         3.53 .015         35.39           96.00         53+81.73         96.00         27         SIPHON         19.09         3.98 .015         35.39	2+95.00	90.75	2+09-00	90.75	45	SIPHON	114.00			910.	25.31	16.36
102.72         28+78.00         103.25         50         CIRCULAR         1316.00         0.000402         13.64 .015         27.88           103.25         29+90.00         79.40         30         SIPHON         112.00         4.91 .015         12.80           79.40         35+22.00         164.50         30         SIPHON         292.00         4.91 .015         12.80           103.42         53+28.82         107.53         4.9         CIRCULAR         5328.82         0.000771         12.57 .015         34.59           107.53         53+88.65         96.00         2-18         SIPHON         19.83         3.53 .015         35.39           96.00         53+81.73         96.00         27         SIPHON         19.09         3.98 .015         35.39	1+09.00	90.75	15+62.00	102.72	45	SIPHON	853.00		9.62	910.	25.31	16.36
103.25         29490.00         79.40         30         SIPHON         112.00         4.91 .015         12.80           79.40         36+22.00         79.40         30         SIPHON         292.00         4.91 .015         12.80           103.42         53+28.82         107.53         48         CIRCULAR         5328.82         0.000771         12.57 .015         34.59         2           107.53         53+68.65         96.00         2-18         SIPHON         19.63         3.53 .015         35.39         2           96.00         53+61.73         96.00         27         SIPHON         19.09         3.98 .015         35.39         2           96.00         54+00.82         106.78         27         SIPHON         19.09         7.98 .015         35.39         2	15+62.00	102.72	28+78.00	103.25	20	CIRCULAR	1316.00	0.000402		510.	27.88	18.02
79.40         33430.00         79.40         30         SIPHON         292.00         4.91 .015         12.80           79.40         36+22.00         1 C4.50         30         SIPHON         292.00         4.91 .015         12.80           103.42         53+28.82         107.53         48         CIRCULAR         5328.82         0.000771         12.57 .015         34.59         2           107.53         53+88.65         96.00         2-18         SIPHON         19.83         3.53 .015         35.39         2           96.00         53+81.73         96.00         27         SIPHON         19.09         3.98 .015         35.39         2           96.00         54+00.82         108.78         27         SIPHON         19.09         3.98 .015         35.39         2	28+78.00	103.25	29+90.00	19.40	30	SIPHON	112.00			510.	12.80	8.27
79.40         36+22.00         1C4.50         30         SIPHON         292.00         4.91 .015         12.80           103.42         53+28.82         107.53         48         CIRCULAR         5328.82         0.000771         12.57 .015         34.59         2           107.53         53+88.65         96.00         2-18         SIPHON         19.83         3.53 .015         35.39         2           96.00         53+81.73         96.00         27         SIPHON         19.09         3.98 .015         35.39         2           96.00         54+00.82         108.78         27         SIPHON         19.09         3.98 .015         35.39         2	29+90.00	19.40	33+30.00	19.40	30	SIPHON	340.00			510.	12.80	8.27
103.42         53+28.82         107.53         48         CIRCULAR         5328.82         0.000771         12.57 .015         34.59           107.53         53+88.65         96.00         2-18         SIPHON         19.83         3.53 .015         35.39           96.00         53+81.73         96.00         27         SIPHON         33.08         3.98 .015         35.39           96.00         54+00.82         108.78         27         SIPHON         19.09         3.98 .015         35.39	33+30.00	79.40	36+22.00	1 04.50	30	SIPHON	292.00			\$10.	12.80	8.27
107.53 53+68.65 96.00 2-18 SIPHON 19.83 3.53.015 35.39 96.00 53+81.73 96.00 27 SIPHON 33.08 33.08 3.98.015 35.39 2	00.00+0	103.42	53+28.82	107.53	4	CIRCULAR	5328.82	0.000771		510.	34.59	22.35
96.00 53+81.73 96.00 27 SIPHON 33.08 3.98 .015 35.39 206.00 54+00.82 108.78 27 SIPHON 19.09 3.99 35.39 2	53+28.82	107.53	53+48-65	00.96	2-18	SIPHON	19.83			510.	35.39	22.88
96.00 54+00.82 108.78 27 SIPHON 19.09 3.98 .015 35.39	53+48.65	00.96	53+81.73	00.96	27	SIPHON	33.08			\$10.	35.39	22.68
	53+61.73	00.96	54+00-82	1 08 - 78	27	NOHdis	19.09		1.98	510.	35.39	22.88

TABLE A-2 MOC INTERCEPTORS SOUTH SYSTEM

126 BRA 57 126 BRA 61 126 BRA 61 127 BRA 01 127 BRA 0	54+00-82											
8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8		108.78	57+67-87	109.06	4	C IRCULAR	367.05	0.000000	12.57	\$10.	27.61	17.84
88 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	57+67.47	109.06	61+66.94	100.37	4	CIRCULAR	398.53	0.000777	12.57	\$10.	34.59	22.35
98 A A A A A A A A A A A A A A A A A A A	61+66.84	109.37	61+76.94	109.38	30	CIRCULAR	10.00	0.00100.0	4.91	.015	11.26	7.28
BRA	61+76.84	109.38	64+61.84	116.42	30	CIRCULAR	263.84	0.026682	4.91	510.	58.18	37.60
BRA	00.00+0	116.40	00.13.00	117.48	30	CIRCULAR	73.00	9.014794	4.91	510.	43.32	28.00
	04.73.00	117.48	9+03-05	132.58	7.2	CIRCULAR	830.05	0.018312	3.98	.015	36.39	23.52
127 BRA 9	9+03.05	132.68	30+49.00	140.52	36	CIRCULAR	2144.95	0.003655	1.07	• 015	35.25	22.78
127 BRA 30	30+48.00	140.52	30+52.00	141.02		TRANSITION	4.00	0.125000				
127 BRA 30	30+52.00	141.02	21+06-00	163.83	30	CIRCULAR	2054.00	0.011105	4.91	.015	37.54	24.26
127 BRA 51	51+06.00	163.83	21+10.00	166.80		TRANSITION	4.00	0.742500				
127 BRA 51	51+10.00	166.80	67+50.00	168.86	4.2	CIRCULAR	1640.00	0.001256	9.62	510.	30.89	19.96
128 BRA 0	00.00+0	168.86	17.06.09	171.00	42	CIRCULAR	1706.00	0.001254	9.65	-015	30.89	19.96
128 BRA 17	17+36.00	171.00	17+20.00	166.00	2-24	SIPHON	14.00		6.28	\$10.	33.97	21.96
128 BRA 17	17+20.00	166.00	17+40.00	171.04	2-24	SIPHON	20.00		6.28	510.	33.97	21.96
128 BRA 17	17+40.00	171.04	17+56.80	172.96	2-24	SIPHON	16.80		6.28	\$10.	33.97	21.96
128 BRA 17	17+56.80	172.06	23+39.00	172.79	45	CIRCULAR	582.20	0.001253	9.62	510.	30.89	19.96
128 NRA 23	23+39.00	172.79	23+43.00	173.73		TRANSITION	•••	0.235000				
128 BRA 23	23+43.00	173.73	32+90.00	188.61	30	CIRCULAR	047.00	0.015649	16.4	.015	44.55	28.79
128 BRA 32	32+90.00	188.61	55+70.85	191.57	42	CTRCULAR	2280.85	0.001297	9.65	.015	31.48	20.34
1284 BRA RAN 0	00.00.0	191.55	36+73.73	196.32	42	CIRCULAR	3673.73	0.001298	9.62	.015	31.48	20.34
128A BRA RAN 36	36+73.73	196.32	84+30.00	200.06	45	CTRCULAR	4756.27	0.000786	9.62	.015	15.45	15.84
1284 BRA RAN 84	84+30.00	200.00	85+10.00	19.102	2-15	SIPHON	90.00		2.45	-015	12.31	7.96

TABLE A-2 MDC INTERCEPTORS SOUTH SYSTEM

Note	SECT	707	FROM	INVERT (FT)	STATION	INVERT (FT)	SIZE (IN)	SHAPE	LENGTH (FT)	SLOPF	ABFA (SOFT)	Z Z Z	CAPACITY (CFS)	(MGD)
Note	128A	BRA RAN	85+10.00	201.61	85+21.00	198.26	33	CIRCULAR	11.00		5.94	.015		
Part	62	DED NED	23+99.61	185.15	76+29.00	188.44	54	CIRCULAR	5229.39	0.000629	15.90	100	49.27	11 . 84
Note	53	DED NED	76+29.00	188.44	78+17-82	189.26	2-33	SIPHON	188.82		11.88	.013	49.63	32.08
NED NED NED NED NED NED NED NED MANHQE   7318-50   190-68   190-	62	DED NED	78+17.82	189.26	00.00+96	190.38	54	C IRCULAR	1782.18	0.00053	15.30		4 , 7	31.84
NED DOV   0+000-00   190-88   73+18-50   195-46   48   CIRCULAR   7318-50   0+000605   12+57 + 011   31-20	150	DED NED	00.00+96	190.38	00.00+96	190.88		DROP MANHOLE						
NED   DOV   73+168-50   196+56   75+68-50   196+56   75+68-50   196+56   75+68-50   196+56   75+68-50   196+56   75+68-50   196+56   75+68-50   196+56   75+68-50   196+56   75+68-50   196+56	30	NED DOV	00.00+0	190.88		195.46	48	CIRCULAR	7318.50	0.000625		.013	35.98	23.25
MED   DIV   75466.50   196.56   75416.50   196.10   196.10   196.20   196	1 30	NED DOV	73+18.50	195.46	75+68.50	196.58	2-27	SIPHON	250.00		7.96	.013	33.20	21.46
NED   DOV   65+43.56   197.19   87+40.50   198.63   2-27   SIPHON   197.00   197.00   7.96 .013   32.00   32.00   32.00   32.40   32	30	NED DOV	75+66.50	196.58	45+43.50	197.19	*	CIRCULAR	00.516	0.000625	12.57	.013	35.98	23.25
MED         DOV         97740.50         198.60         99427.19         198.83         48         CIRCULAR         1186.65         0.000624         12.57         0.13         35.98           MEL         NAT         0.000.00         198.83         99414.00         204.40         204.80         48         CIRCULAR         4.00         0.000624         12.57         0.01         35.98           NAT         0.000.00         204.80         0.044.00         205.12         24.80         CIRCULAR         4.00         0.000624         12.57         0.13         35.98           NAT         0.000.00         205.12         205.22         2.27         SIPHON         117.00         4.00         12.57         0.13         35.78           NAT         0.420.09         205.12         2.27         SIPHON         117.00         2.00         12.57         0.13         37.78           NAT         0.420.09         210.29         210.29         2.27         SIPHON         2.25.00         2.000.69         12.57         0.13         37.78           NAT         1.145.90         2.11.53         2.11.53         2.27         2.27         0.000.60         0.000.60         12.57         0.13         37.8	30	NED DOV	85+43.50	197.19	87+40.50	198.09	2-27	NOHOIS	197.00		7.96	.013	32.00	20.68
MAT         0+00-00         198-83         89914+00         204-40         48         CIRCULAR         8914+00         0+000624         12-57         013         35-98           MAT         0+00-00         204-80         0+70+00         204-80         0+70-00         205-12         48         CIRCULAR         4-60-00         1-5-57         013         37-78           MAT         0+00-00         205-12         5+87-00         205-92         2-27         51PHON         117-00         7-96-013         37-78           MAT         4+770-00         205-12         5+87-00         205-92         2-27         51PHON         117-00         7-96-013         37-78           MAT         4+770-00         205-12         5+87-00         205-92         2-27         51PHON         117-00         7-96-013         37-78           MAT         7+482-00         211-53         7+45-98         211-53         2-27         51PHON         225-00         7-96-013         37-18           MAT         7+492-00         211-53         7+45-98         211-57         48         CIRCULAR         46-02         0-000669         12-57         013         37-84           MAT         7+922-00         220-47	1 30	NED DOV	87+40.50	198.09	99+27-19	198.83	48	CIRCULAR	1186.69	0.000623		.013	35.98	23.25
NAT         0+000.00         204.80         204.80         TRANSITION         4.00 <td>131</td> <td>WEL NED</td> <td>00.00+0</td> <td>198.83</td> <td>89+14.00</td> <td>204.40</td> <td>8.4</td> <td>CIRCULAR</td> <td>8914.00</td> <td>0.000624</td> <td>12.57</td> <td>.013</td> <td>35.98</td> <td>23.25</td>	131	WEL NED	00.00+0	198.83	89+14.00	204.40	8.4	CIRCULAR	8914.00	0.000624	12.57	.013	35.98	23.25
0+04+00         204+80         4+70+00         205-12         4-8         CIRCULAR         4-6-6-00         0+000-657         12+57         1013         37-78           4+70+00         205-12         5+87+00         205-92         2-27         SIPHON         117-00         7-96         -013         34-51           5+87+00         205-92         5+87+00         205-92         2-27         SIPHON         117-00         7-96         -013         34-51           69+20-98         210-29         210-29         211-53         2-27         SIPHON         225-00         7-96         -013         34-10           71+45-98         211-53         71+92-00         211-57         4-8         CIRCULAR         46-02         0-000689         12-57         -013         37-78           71+92-00         211-57         220-47         AB         CIRCULAR         790-00         12-57         -013         37-84           79+82-00         221-00         224-72         AB         CIRCULAR         790-00         0-000670         12-57         -013         37-84           79+82-00         221-00         224-72         AB         CIRCULAR         2498-73         0-000699         12-57         -013	132	TAN	00.00+0	204.80	00.000	204.80		TRANSITION	***					
NAT         5+870.00         205.12         5+87.00         205.92         2-27         SIPHON         117.00         7.96         1013         34.51           NAT         5+87.00         205.92         69+20.98         210.29         48         CIRCULAR         6.333.96         0.000689         12.57         1013         37.76           NAT         71+45.98         210.29         71+45.98         211.53         71+92.00         211.57         48         CIRCULAR         46.02         0.000689         12.57         1013         42.43           NAT         71+92.00         211.57         220.47         48         CIRCULAR         46.02         0.000670         12.57         1013         42.43           NAT         71+92.00         220.47         220.47         48         CIRCULAR         790.00         0.000670         12.57         1013         37.89           NAT         71+92.00         221.00         224.72         224.72         0RQP MANHQLE         790.00         0.000692         12.57         1013         37.86           NAT         79+82.00         224.72         224.72         48         CIRCULAR         2498.73         0.000692         12.57         1013         37.78	132	NAT	00.000	204.80	4+70.00	205.12	48	CIRCULAR	466.00	0.000687	12.57	.013	37.78	24.42
NAT         5+87.00         205.92         69+20.98         210.29         48         CIRCULAR         6333.98         0.000689         12.57 .013         37.78           NAT         71+45.98         210.29         71+45.98         211.53         71+45.98         212.57         7192.00         7.96 .013         35.10           NAT         71+92.00         211.57         71+92.00         220.47         A8         CIRCULAR         46.02         0.000670         12.57 .013         42.43           NAT         71+92.00         220.47         A8         CIRCULAR         790.00         0.000670         12.57 .013         37.29           NAT         79+82.00         221.00         224.72         A8         CIRCULAR         790.00         0.000670         12.57 .013         37.86           NAT         79+82.00         224.72         A8         CIRCULAR         2498.73         0.000692         12.57 .013         37.86           NAT         79+82.00         224.72         A8         CIRCULAR         2498.73         0.000692         12.57 .013         37.86	132	TAN	4+70.00	205.12	5+87.00	205.92	2-27	SIPHON	117.00		7.96	.013	34.51	22.31
NAT         71+45.98         211.53         2-27         STDHON         225.00         7.96 .013         36-10           NAT         71+45.98         211.53         71+92.00         211.57         71+92.00         211.57         71+92.00         12.57 .013         42.43           NAT         71+92.00         220.47         48         CIRCULAR         790.00         0.000670         12.57 .013         37.29           NAT         79+82.00         221.00         79+82.00         224.72         DRODP MANHOLE         790.00         0.000670         12.57 .013         37.86           NAT         79+82.00         224.72         48         CIRCULAR         2498.73         0.000692         12.57 .013         37.86           NAT         79+82.00         224.72         48         CIRCULAR         2498.73         0.000692         12.57 .013         37.86           NAT         79+82.00         224.72         48         CIRCULAR         2498.73         0.000692         12.57 .013         37.78	132	TAN	5+87.00	205.92	69+20.98	210.29	48	CIRCULAR	6333.98	0.000689	12.57	.013	37.78	24.42
NAT         71+45.98         211.53         71+92.00         211.53         71+92.00         211.57         48         CIRCULAR         46.02         0.000869         12.57         .013         42.43           NAT         71+92.00         211.57         71+92.00         220.47         48         CIRCULAR         790.00         0.000670         12.57         .013         37.29           NAT         79+82.00         221.00         79+82.00         224.72         DROD MANHOLE         37.00         12.57         .013         37.86           NAT         79+82.00         224.72         48         CIRCULAR         2498.73         0.000692         12.57         .013         37.86           NAT         79+82.00         224.72         48         CIRCULAR         2498.73         0.000692         12.57         .013         37.86           NAT         79+82.00         226.45         17427.53         227.64         48         CIRCULAR         2498.73         0.000692         12.57         .013         37.78	132	TAN	69+20.98	210.29	71+45.98	211.53	2-27	SIPHON	225.00		1.96	.013	36.10	23.34
NAT 71+92.00 211.57 71+92.00 220.47 DROP MANHOLE  NAT 71+92.00 220.47 79+82.00 221.00 221.00 79+82.00 224.72 DROP MANHOLE  NAT 79+82.00 224.72 104+80.73 226.45 48 CIRCULAR 2498.73 0.000692 12.57 .013 37.86  NAT 0+000.00 226.45 17+27.53 227.64 48 CIRCULAR 1727.53 0.000688 12.57 .013 37.78	132	TAN	71+45.98	211.53	71+92.00	211.57	8	CIRCULAR	46.02	0.000869		.013	42.43	27.42
NAT 79+82.00 220.47 79+82.00 221.00 48 CIRCULAR 790.00 0.000670 12.57 .013 37.29  NAT 79+82.00 221.00 79+82.00 224.72 DROP MANHOLE  NAT 79+82.00 224.72 104+80.73 226.45 48 CIRCULAR 2498.73 0.000692 12.57 .013 37.86  B NAT 0+000.00 226.45 17+27.53 227.64 48 CIRCULAR 1727.53 0.000688 12.57 .013 37.78	132	TAN	71+92.00	211.57	71+92.00	220.47		DROP MANHOLE						
NAT 79+82.00 221.00 79+82.00 224.72 DROP MANHOLE  NAT 79+82.00 224.72 104+80.73 226.45 48 CIRCULAR 2498.73 0.000692 12.57 .013 37.86  B NAT 0+00.00 226.45 17+27-53 227.64 48 CIRCULAR 1727.53 0.000688 12.57 .013 37.78	135	NAN	71+92.00	220.47	79+82.00	221.00	8	CIRCULAR	790.00	0.000670		.013	37.29	24.10
NAT 79+82.00 224.72 104+80.73 226.45 48 CIRCULAR 2498.73 0.000692 12.57 .013 37.86 B NAT 0+00.00 226.45 17+27.53 227.64 48 CIRCULAR 1727.53 0.000688 12.57 .013 37.78	135	NAT	79+82.00	221.00	79+82.00	224.72		DROP MANHOLE						
NAT 0+00.00 226.45 17+27-53 227-64 48 CIRCULAR 1727-53 0.000688 12-57 .013 37.78	35	NAT	79+82.00	224.72	104+80.73	226.45	48	CIRCULAR	2498.73	0.000692		.013	37.86	24.47
	338		00.00+0		17+27-53	227.64	84	CIRCULAR	1727.53	0.000688		.013	37.78	24.42

TABLE A-2 MOC INTERCEPTORS SOUTH SYSTEM

135   141   17.27.23   227.04   221.10   231.43   401.42   241.41   241.4	SECT	707	FROM	(FT)	STATION	INVERT (FT)	SIZE	SHAPE	LENGTH (FT)	SLOPE	(SOFT)	ZZZ	CAPACITY (CFS) (	(MGD)
NATE   1211301   231441   232744   248544   248544   24811470   0.0000643   14.57.013   26.46   1   1   1   1   1   1   1   1   1	1 338		17+27.53	227.64	72+13.01	231.43	48X54	EXT. CIRCLE	5485.48	0.000000	14.57	.013	46.11	29.80
Mail	1 338		72+13.01	231.43	96+24.71	232.74	48X54	EXT. CIRCLE	2411.70	0.000543	14.57	.013	\$0.04	26.47
Nat   Nat	1 338		96+24.71	232.74		233.06	45	CIRCULAR	465.29	0.000687	9.62	.013	56.46	17.10
NAI FRW   13+34-00   236-11   343-34-00   236-51   NAI FRW   A14-34-00   236-51   A14-34-00   236-51   A14-34-00   236-51   A14-34-00   236-51   A14-34-00   236-51   A14-24-00   241-19   A14-24-00   A14-24	1 338		100+00+001	233.06		235.13	4	CIRCULAR	2997.57	0.0000000	12.57	.013	37.78	24.42
NAT FRM   13+34.00   236.01   43+34.00   245.51   48+75.00   245.61   42   CIRCULAR   466.00   0.000617   0.62 0.013   24.15   14.15	134	NAT FRW		235.13	43+34.00	236.01	8	CIRCULAR	1334.00	0.000659	12.57	.013	36.95	23.88
NAT   FRM   48+20.00   236-51   48+20.00   237-31   2-24   51940N   55.00   0.000667   0.42 0.013   24.15   1     NAT   FRM   48+20.00   235-81   48+75.00   237-31   2-24   51940N   55.00   0.000665   0.62 0.013   24.15   1     NAT   FRM   48+75.00   237-31   107-02-00   241-19   2-24   51940N   593-00   0.000665   0.62 0.013   24.15   1     NAT   FRM   107-02-00   241-19   114-75-94   245-58   245-58   246-79	1 34	NAT FRM		236.01	43+34.00	236.51		DROP MANHOLE						
NAT FRW         48+75.00         236.81         48+75.00         236.81         48+75.00         231.31         107409.00         241.10         2-24         51940N         55.00         6.28         0.13         24.15         12.15         24.15         24.15         24.11         22.24         24.11         22.24         24.11         22.24         24.11         22.24         24.11         22.24         24.11         24.25         24.11         24.25         24.11         24.25         24.11         24.25         24.11         24.25         24.11         24.25         24.11         24.25         24.11         24.25         24.11         24.25		NAT FRM		236.51	48+20.00	236.81	42	CIRCULAR	486.00	0.000617	9.62	.013	25.04	16.19
MAT FRM         4875.00         217.31         10700.00         241.10         241.10         42         CIRCULAR         5634.00         0.000665         9.62 .013         25.94         1           CAN NOS         107.00         241.10         114.75.94         245.58         42         CIRCULAR         466.95         0.000400         9.62 .013         25.94         1           CAN NOS         1000.00         140.10         140.26         140.26         12.15.18         SIPHON         23.62         3.78 .015         15.94         1           CAN NOS         145.00         140.28         12.15.18         SIPHON         23.62         3.78 .015         15.94         1           CAN NOS         145.00         140.44         12.15.18         SIPHON         29.62         3.78 .015         15.94         1           CAN NOS         145.00         140.44         12.15.18         SIPHON         29.62         3.78 .015         15.94         1           CAN NOS         145.00         144.19         140.44         12.15.18         SIPHON         29.62         3.78 .015         15.94         1           CAN NOS         144.25.30         144.19         144.19         144.19         144.19	1 34	NAT FRM		236.81	48+75.00	237.31	2-24	SIPHON	25.00		6.28		24.15	15.61
CAN NOR         1+57+00         140-16         1+175+00         140-26         42         CIRCULAR         466-96         0.000400         9-62-013         97.75           CAN NOR         1+37-67         140-26         140-26         140-26         150-16         137-67         150-94         133-96         133-9	134	NAT FRM		237.31		241.19	45	CIRCULAR	5834.00	0.000665	9.62		25.94	16.76
CAN NOW         1+37-67         140-26         36         CIRCULAR         137-67         0.000600         7.07.015         13.96           CAN NOW         1+31-67         140-26         1+61-09         140-26         12-15-18         SIDHON         23-50         3.78.015         15-94         1           CAN NOW         1+61-09         140-26         143-36         12-15-18         SIDHON         29-62         3.78.015         15-94         1           CAN NOW         4+25-30         140-24         143-36         140-24         12-15-18         SIDHON         29-62         1-59-6         15-94         1           CAN NOW         4+25-30         140-34         145-36         143-36         12-15-18         SIDHON         29-62         1-59-6         15-94         1           CAN NOW         13-55-00         144-39         144-39         144-39         147-79         30         CIRCULAR         3245-00         0.001047         4-91-015         11-52           NOW         0.000-00         147-79         153-35         145-36         145-36         30         CIRCULAR         372-00         0.00147         4-91-015         11-52           NOW         0.000-00         152-85	- 34	NAT FRM				245.58	42	CIRCULAR	466.95	0.009400	9.62	.013	97.79	63.17
CAN NUM         1+37.67         140.26         1+61.09         140.28         12·15·18         SIDHON         23.50         3.78         15.94         15.94         1           CAN NUM         1+61.09         1+61.09         1+61.09         140.28         12·15·18         SIDHON         264.21         3.78         15.94         1           CAN NUM         1+61.09         1+62.30         140.44         4+55.92         143.36         12·15·18         SIDHON         29.62         3.78         15.94         1           CAN NUM         4+55.32         140.44         4+55.00         144.39         56+00.00         147.79         30         CIRCULAR         3245.00         0.001047         7.07         11.52         11.52           NUM         13+55.00         147.79         30         CIRCULAR         3245.00         0.001047         7.01         10.07         11.52           NUM         0.000.00         147.79         153.35         153.25         153.27         0.000040         4.91         101.015         10.07           NUM         0.000.00         152.85         634.27         153.31         84         CIRCULAR         12400.07         0.000040         4.91         101.015         10	135	CAN NO.			1+37.67	140.26	36	CIRCULAR	137.67	0.0000000	7.07	\$10.	13.96	9.02
CAN NOR         1+61.09         140.28         4+25.30         140.44         12.15.18         SIPHON         264.21         3.78 .015         1594         1594           CAN NDR         4+25.30         140.44         4+25.30         140.44         4+25.30         140.44         4+25.30         140.01         3.78 .015         3.78 .015         1594         11594	135	CAN NOR			1+61.09	140.28	12.15.18	SIPHON	23.50		3.78		15.94	10.30
CAN NDR         4+54.92         140.44         4+54.92         143.36         12.15.18         SIPHON         29.62         3.78         15.91         11           CAN NDR         4+54.92         144.36         13+55.00         144.39         56+00.00         144.39         56+00.00         144.39         56+00.00         147.79         30         CIRCULAR         3245.00         0.001047         7.01         10.59         11.52           NDR         0.000.00         144.39         56+00.00         152.48         30         CIRCULAR         3227.00         0.001047         7.01         11.52         11.52           NDR         63+27.00         152.48         63+27.00         152.48         6499.00         162.00         24         CIRCULAR         372.00         0.002350         3.14         015         10.07           NDR         63+27.00         152.48         65+99.00         162.00         24         CIRCULAR         372.00         0.003550         3.14         015         10.07           NDR         0.000.00         129.00         166.00         130.31         192+14.97         138.13         194         CIRCULAR         12490.97         0.0000626         38.48         013         160.00	135	CAN NOR			4+25.30	140.44	12.15.18	NOHAIS	264.21		3.78	510.	15.94	10.30
CAN NOR         13+55.00         144.39         36         CIRCULAR         900.08         0.001144         7.07.015         19.59         1           CAN NOR         13+55.00         144.39         56+00.00         147.79         30         CIRCULAR         3245.00         0.001047         4.91.015         11.52           NUR         0+000.00         147.79         53+27.00         152.85         53+27.00         153.35         A.91.015         10.07           NUR         63+27.00         152.85         66+99.00         152.00         24         CIRCULAR         372.00         0.023520         3.14.015         10.07           NUR         63+27.00         152.85         66+99.00         152.00         24         CIRCULAR         372.00         0.023520         3.14.015         10.07           NUR         0+00.00         129.00         130.31         84         CIRCULAR         1500.00         0.00048         38.48.013         183.10         11           WHO         0+000.00         129.00         130.31         130.31         84         CIRCULAR         12490.97         0.000626         38.48.013         183.10         11           WHO         0+000.00         129.00         130.31 </td <td>135</td> <td>CAN NO.</td> <td></td> <td>1.00.00</td> <td>4+54.92</td> <td>143.36</td> <td>12.15.18</td> <td>NOHOIS</td> <td>29.62</td> <td></td> <td>3.78</td> <td>\$10.</td> <td>15.94</td> <td>10.30</td>	135	CAN NO.		1.00.00	4+54.92	143.36	12.15.18	NOHOIS	29.62		3.78	\$10.	15.94	10.30
CAN NOR         13+55.00         144.39         56+00.00         147.79         30         CIRCULAR         3245.00         0.001047         4.91.015         11.52           NUGR         0+00.00         152.85         63+27.00         152.85         63+27.00         152.05         4.91.015         10.07           NUGR         63+27.00         152.85         66+99.00         162.00         24         CIRCULAR         372.00         0.023520         3.14.015         10.07           NUGR         0+000.00         152.85         66+99.00         152.00         130.31         84         CIRCULAR         1600.00         0.0004818         39.48.013         183.10         11           WHO         0+0234.00         130.31         84         CIRCULAR         12490.97         0.000626         38.48.013         180.00         10           WHO         0+024.00         130.31         192+14.97         138.13         192+14.97         174.40         0000626         38.48.013         180.00         10	135	CAN NOR			13+55.00	144.39	36	CIRCULAR	900.006	0.001144	1.01		19.59	12.66
NGR 63+27.00 152.85 63+27.00 153.35 BORDHANHOLE ST27.00 0.000799 4.91 .015 10.07  NGR 63+27.00 152.85 66+99.00 152.00 24 CIRCULAR 372.00 0.003520 3.14 .015 30.12  NGR 63+27.00 152.85 66+99.00 153.35 BA CIRCULAR 1600.00 0.000818 38.48 .013 183.10  NHG 0+00.00 129.00 130.31 192+14.97 138.13 BA CIRCULAR 12490.97 0.000626 38.48 .013 150.00  NHG 192+14.97 138.13 192+14.97 174.40 BORDH MANHOLE	1 35	CAN NOR		144.39		1.7.79	30	CIRCULAR	3245.00	0.0010047	10.0	.015	11.52	7.45
NGR 634-27.00 152-85 65499.00 152-00 24 CIRCULAR 372.00 0.023520 3.14 .015 30.12  NGR 634-27.00 152-85 66499.00 152.00 24 CIRCULAR 372.00 0.000818 39.48 .013 183.10  NHO 674-24.00 130-31 192+14.97 138-13 84 CIRCULAR 12490.97 0.000626 38.48 .013 150.00  NHO 192+14.97 138-13 192+14.97 174.40 DROP MANHOLE	1 36	NON	00.00.00		63+27.00	152.45	30	CIRCULAR	6327.00	0.000199	16.4	\$10.	10.01	15.9
NGR 634-27.00 152-85 664-99.00 162-00 24 CIRCULAR 372.00 0.023520 3.14 .015 30.12  WHG 0+00.00 129-00 16+03.00 130.31 84 CIRCULAR 1600.00 0.000818 38-48 .013 183.10  WHG 67+24.00 130.31 192+14.97 138.13 84 CIRCULAR 12490.97 0.000626 38.48 .013 160.00	1 36	AUA	63+27.00	152.85		153,35		DROP MANHOLE						
MMO 67+24.00 [30.3] [92+14.97 [38.13] 84 CIRCULAR [600.00 0.000818 38.48.0] [183.10] MMO 192+14.97 [38.13] 84 CIRCULAR [2490.97 0.000626 38.48.0] [60.00]	135	NOR	63+27.00			162.00	54	CIRCULAR	372.00	0.023520	3.14	.015	30.12	19.47
WHO 67+24.00 130.31 192+14.97 138.13 BA CIRCULAR 12490.97 0.000626 38.48 .013 150.00	1374		00.00.0	150.00		130.11	**	CIRCUL AR	1600.00	0.000918	38.48	.013	183.10	118.33
WHO 192+14.97 138-13 192+14.97 174.40	137	CHA	67+24.00	130.31	192+1	138.13	*	CIRCULAR	12490.97	0.000626	38.48	.013	160.00	103.40
	137	04.	192+14.97	138.13	192+14.97	174.40		DROP MANHOLE						

TABLE A-2 MDC INTERCEPTORS SOUTH SYSTEM

SECT		SECT FROM INVERT TO	INVERT	10	INVERT SIZE SHAPE LENGTH SLOPE AREA MANN CAPACITY	SIZF	SHAPE	LENGTH	LENGTH SLOPE AREA MANN CAPACITY	AREA	ZZZ	AREA MANN CAPACITY	
9	L0C	NO LOC STATION (FT) STATION	(FT)			2							
138	NED DED	138 NED DED 192+14.97 174.44 201+83.00 175.04	174.44	201+83.00	175.04	48	84 CIRCULAR	968.02	968.02 0.000619 38.48 .013 160.00 103.40	38.48	.013	160.00	103.40
138	NED DED	138 NED DED 201+83.00 175.04 208+00.00 176.41	175.04	208+00-00	176.41	72	72 CIRCULAR	617.00	617.00 0.002220 28.27 .013 200.00 129.26	28.27	.013	200.00	129.26
138	NED DED	138 NED DED 208+00.00 176.41 324+00.50 185.15	176.41	324+00-50	185.15	09	60 CTRCULAR	11600.50	11600.50 0.000753 19.64 .013 71.62 46.29	19.64	.013	71.62	46.29

# TABLE A-3. ABBREVIATIONS USED IN TABLES A-1 AND A-2

ABC ARL BLM BOS BRA BRI BRO CAM CHA CHC CHL DED DOV DOR EB EVE FRA HP LEX MFD	Alewife Brook Conduit Arlington Belmont Boston Braintree Brighton Brookline Cambridge Canton Charlestown Charles River Crossin Chelsea Dedham Deer Island Dover Dorchester East Boston Everett Framingham Hyde Park Lexington Malden Medford	NEP VAL NEW NOR NS OS QUI RAN REA REV ROX SOM SHM STO WAK WLP WAL WAT WRO WEL WEY WIL	Needham Neponset Valley Newton Norwood New Section Over Old Old Section Quincy Randolph Reading Revere Rindge Avenue Roxbury Somerville Stoneham Stoughton Wakefield Walpole Waltham Watertown West Roxbury Wellesley Weymouth Wilmington
		WIL	Wilmington ·
MEL	Melrose	MIN	Winchester
MVS	Mystic Valley Sewer	WTP	Winthrop
MTN	Milton	WOB	Woburn
MTN CON	Milton Connection		
NAT	Natick		

APPENDIX B
INTERCEPTOR MODELING PACKAGES

#### APPENDIX B

## INTERCEPTOR MODELING PACKAGES

For the purpose of computer modeling the MDC interceptor systems, all the interceptors are divided into 61 groups. These groups are arranged in such a way as to represent the system as it presently functions (1975). Each of these groups are called modeling packages. The North Metropolitan Sewerage System consists of 45 modeling packages and the South Metropolitan Sewerage System is divided into 16 modeling packages. Table B-1 lists the modeling packages and the interceptors that are included in each of these packages.

TABLE B-1. INDEX OF INTERCEPTOR MODELING PACKAGES

Model package No.	Interceptor names and section numbers included	System
N-1	North Metropolitan Sewer (Sections 2-9)	North
N-2	North Metropolitan Sewer (Sections 12, 14-20, 21 portion)	North
N <b>-</b> 3	North Metropolitan Sewer (Section 21 portion)	North
	Alewife Brook Sewer (Sections 43-1/2, 43)	North
N-4	North Metropolitan Sewer (Sections 22 portion)	North
	Milbrook Valley Sewer (Sections 77-80 and 82-85)	North
N-5	North Metropolitan Sewer (Sections 22 portion, 44-1/2, 45-46)	North
N-6	North Metropolitan Relief Sewer (Sections 102-108)	North

TABLE B-1 (Continued). INDEX OF INTERCEPTOR MODELING PACKAGES

Model package No.	Interceptor names and section numbers included	System
N <b>-</b> 7	North Metropolitan Relief Sewer (Sections 111-114, 115A, 115B)	North
<b>1–</b> 8	New Mystic Valley Sewer (Sections 109-110, 67-70)	North
N <b>-</b> 9	Reading Extension Sewer (Sections 71-76)	North
N-10	Wilmington Extension Sewer (Sections 88-90)	North
N-11	Mystic Valley Sewer	North
N <b>-</b> 12	Cummingsville Branch Sewer (Section 47)	North
N-13	Cummingsville Branch Relief Sewer (Section 86)	North
J <b>- 1</b> 4	Alewife Brook Conduit	North
N-15	Lexington Branch Sewer (Sections 52-53)	North
N-16	Milbrook Valley Relief Sewer (Sections 91A, 91B, 92-93)	North
N-17	Wakefield Branch Relief Sewer (Sections 87, 64, 58-60)	North
N-18	Wakefield Trunk Sewer (Section 40 portion)	North
	Malden Branch Relief Sewer (Section 95)	
N-19	Malden Branch Sewer (Sections 54-55)	North
<b>1-</b> SO	Malden Branch Sewer (Sections 65-66)	North

TABLE B-1 (Continued). INDEX OF INTERCEPTOR MODELING PACKAGES

Model package No.	Interceptor names and section numbers included	System
N-21	Malden Branch Relief Sewer (Section 95A)	North
	Wakefield Trunk Sewer (Sections 40 portion and 41)	mench Nas mench
	Stoneham Trunk Sewer (Section 42)	
N-22	Wakefield Branch Sewer (Sections 49-50)	North
N-23	Stoneham Extension Sewer (Section 51)	North
N-24	Chelsea Branch Sewer (Sections 11, 56-57)	North
N-25	Revere Branch Sewer (Sections 61-62)	North
N-26	Revere Branch Sewer (Section 57A)	North
N-27	South Charles Sewer (Sections A-H)	North
N-28	South Charles Relief Sewer (Sections 5, 1-4, and 4A)	North
N-29	North Charles Relief Sewer (Sections CRC, 204, 207A and 207B)	North
N-30	North Charles Metropolitan Sewer (Sections 29-30, 63)	North
N-31	North Charles Metropolitan Sewer (Section 209)	North
N-32	Cambridge Branch Sewer (Sections 23-25, 25-1/2, 26-28)	North

TABLE B-1 (Continued). INDEX OF INTERCEPTOR MODELING PACKAGES

Model package No.	Interceptor names and section numbers included	System
N-33	Charlestown Branch Sewer (Sections 31-32)	North
N-34	Somerville-Medford Branch Sewer (Section 35)	North
N-35	East Boston Branch Sewer (Sections 37-1/2, 37, 38 portion)	North
N-36	East Boston Branch Sewer (Section 38 portion)	North
N-37	East Boston Branch Sewer (Section 39)	North
N-38	Alewife Brook Conduit Belmont Branch	North
N-39	Belmont Branch Sewer (Section 81)	North
N-40	Bryant Street East Sewer, Malden	North
N-41	Bryant Street East Sewer, Malden	North
N-42	East Boston Interceptor (Section 38BR)	North
N-43	East Boston Interceptor (Section 39BR)	North
N-44	East Boston Interceptor (Section 36)	North
N-45	Dorchester Interceptor	North
	Neponset Valley Sewer (Sections 9-14, 15 portion)	

TABLE B-1 (Continued). INDEX OF INTERCEPTOR MODELING PACKAGES

Model package No.	Interceptor names and section numbers included	System
S-1	High Level Sewer (Sections 45-68)	South
S-2	High Level Sewer (Sections 69-75)	South
S <b>-</b> 3	Brighton Branch Sewer (Sections 80-87)	South
S-4	Braintree-Weymouth Extension Sewer (Sections 122-125)	South
	Braintree-Randolph Extension Sewer (Sections 126-128)	South
S-5	Braintree-Randolph Extension Sewer (Sections 128-128A)	South
S-6	Braintree Connection (Section 125 BR)	South
S-7	New Neponset Valley Sewer (Sections 107-115)	South
	Stoughton Extension Sewer (Sections 119-121)	South
S-8	Hyde Park Connection (Section 31)	South
S-9	Dedham Connection (Section 32)	South
S-10	Westwood Extension Sewer (Sections 135-136)	South
S-11	Walpole Extension Sewer (Sections 116-118)	South
S-12	Upper Neponset Valley Sewer (Sections 15 portion, 16-29)	South

TABLE B-1 (Continued). INDEX OF INTERCEPTOR MODELING PACKAGES

Model package No.	Interceptor names and section numbers included	System	150cl 12cl 15cl
S-13	Upper Neponset Valley Sewer (Section 30)	South	4.48
S-14	Wellesley Extension Sewer (Section 98-106)	South	
S-15	Wellesley Extension Relief Sewer (Sections 137A-131)	South	
S-16	Framingham Extension Sewer (Sections 132-134)	South	

These packages are on file at The Metropolitan District Commission.

APPENDIX C

INTERCEPTOR ANALYSIS PROGRAM INSTRUCTIONS

### APPENDIX C

## INTERCEPTOR ANALYSIS PROGRAM INSTRUCTIONS

This appendix presents the user instructions for the computer program used in modeling the MDC interceptor system. Described here is the Metcalf & Eddy PHP PROGRAM (as modified for MDC and called PHPA).

## General

Name: PHPA. The program PHPA presented here is a modified version of Metcalf & Eddy Plant Hydraulics Profile Program (PHP). The original program was modified to remove sections not applicable for modeling the MDC interceptors.

The program PHPA is designed to com-Description. pute losses through hydraulic elements in sewers and treatment plants and thereby determine their hydraulic profile. PHPA consists of a SUPERVISOR PROGRAM, two main programs PHPO and PHP1, and a number of subprograms. The SUPERVISOR PROGRAM determines whether to use PHPO or PHP1 based on whether the flow is subcritical or supercritical. Each program identifies the type of element through which flow is currently passing and then calls appropriate subprograms to do the required computations. In this way, each main program, starting with an initial hydraulic grade line, calculates losses and flow properties through each successive element. PHPO does all computations in a downstream to upstream sequence for subcritical flow and PHP1 performs all computations in an upstream to downstream sequence for supercritical flow. During computation the program checks the flow condition in each sewer section and identifies whether the flow is subcritical or supercritical.

Purpose. The program is used as a tool for the hydraulic analysis of water and wastewater treatment plants, sewer and interceptor networks, etc. It can be used to determine those pipes in an interceptor network that are inadequate to transport the peak design flows and to examine the conditions in a sewer system under alternative pipe replacement or relief strategies for remedial action.

<u>Capabilities and Features</u>. Program PHPA can be used to compute water surface profiles or hydraulic grade lines for a system consisting of any combination of the following elements:

- 1. Bar Screens (Five Types).
- 2. Bends (Pipes or conduits flowing full or part full).
- Contractions and Expansions (Pipe, conduit or open channel).
- 4. Pipes, conduits, or open channel outfalls.
- 5. Pipe, conduit or open channel segments.
- 6. Unit operation (such as comminutors, pumps, flow measuring devices, etc.).
- 7. Grit chambers.
- 8. Chlorine chambers.
- 9. Siphons.

The program is independent of the sequence of the various elements listed above. In addition, the same element may occur in the flow path repeatedly. There are also many options available to the user. For details, please refer to the user instructions.

Restrictions and Limitations. This modified version of PHP is restricted in its use mostly to components encountered in the MDC interceptor system.

The program requires knowledge of the flow in each section in order to compute the hydraulic conditions of an interceptor system. Therefore, in the case of parallel pipes, the division of flow must be estimated initially and corrected by trial runs.

## User Instructions

Program Processing. Program PHPA consists of a number of subroutines each of which is developed to do certain computations. For subcritical flow the flow profile computations usually start at an outfall and proceed upstream. However, the computation can be started at any place in a flow path where the water surface is known or can be computed. For supercritical flow the computations usually start at a critical section and proceed downstream. In general, every element in the flow path requires two data cards describing the properties of the particular element. For the inverted siphon, three data cards are required. In

some cases a third card may be required or used to read in downstream flow properties.

Logistics. Program PHPA will run on a machine as small as IBM 1130 with 8K storage.

Input Data Requirements. Input data requirements for program PHP are given in Table C-1. In general, two data cards are required for each element in the flow path. The program usually uses for downstream cross-sectional properties the upstream cross-sectional properties of the previous element in the flow path as these are the same when traveling from downstream to upstream direction. In some cases these two cross-sections are not the same, and, therefore, new cross-sectional properties for the downstream section are necessary. The program reads in new cross-sectional properties for the downstream section of the particular element when the user sets indicator KTYPE equal to any positive integer. A listing of a PHPA input data is presented in Table D-2 as an example.

Error Correction and Resubmission. If there are any errors in the computation they will be due to input data errors. Therefore, it is desirable to get a listing of the input data and check it thoroughly before submitting for a run.

Interpretation of Results. The results of the PHPA run are self-explanatory. Each particular output is identified clearly. An example of PHPA output is presented in Table D-3.

# Documentation of Technical Concepts

Program PHPA consists of a number of subroutines each of which is developed to compute loss through a flow element. Theoretical basis of the loss computation in each case is presented here.

Theory. Bar Screen losses. The energy loss for flow through bar screens depends upon the shape, size, and spacing of the bars and the velocity of flow. Head loss hbar can be expressed as:

 $h_{\text{bar}} = K \frac{V^2}{2g}$ 

TABLE C-1. INPUT DATA DESCRIPTION

Card group	Entry	Card group Entry Format	Card columns	Description	Varia	Variable Maximum name value	Maximum value	Default value
A	٦	ħI	2-5	Project number		JOB	6666	None
	2	6A4	7-30	Project name		PRONA(I)		None
	m	5A2	31-40	User name		NAME(I)		None
	4	II .	08	Job type: sub- critical or super- critical flow. Use 1 for super- critical flow with computation moving downstream. Leave blank for subcritical flow or use 0		JOBTP		0
Д	н	F10.4	1-10	Starting hydraulic ft. grade line below outfall	t.	HGL		None
	2	F10.4	11-20	Flow ratio: flow on data cards are multiplied by this ratio thus allowing the same data cards to be used for different flows	ឌ សុស	RATIO		1.00

TABLE C-1 (Continued). INPUT DATA DESCRIPTION

Default value	0.0		None		None		None	None
e Maximum value								a
Variable name	DHGL		FROM		OL		TITLE	ISCND*
Units	ft.					E J		ion .
Description	Downstream hydraulic grade that may cause hydraulic jump.	JOBTP equals 1 for supercritical flow.	Identification of downstream location for subcritical flow and upstream location	for supercritical flow.	Identification of upstream location	for subcritical flow and downstream location for supercritical flow.	Type of particular element to be printed in output.	Index for down- stream cross-section type; 1 for pris- matic (rectangular, trapezoidal, etc.) 2 for circular.
Card columns	1-10		1-8		10-17		19-38	30-40
Entry Format	F10.4		2A4		2A4		5A4	110
	1		ri .		2		m	4
Card group	<b>B1</b>		O					

TABLE C-1 (Continued). INPUT DATA DESCRIPTION

Card		Entry Format	Card columns	Variable Maximum Description Units name value	mum Default e value
Cont	2	110	41-50	Index for upstream ISECN* 2 cross-section type; 1 for prismatic, 2 for circular	None
	v	110	51-60	Index for element ITYPE* 11 type. See explanation below.	None
		ITYPE	Lowew Pu	For bends For pipe, conduit, channel, grit chambers, chlorine chambers For contraction or expansion Bar screen Outfall Unit operations Inverted siphons	bers, chlorine
	7	110	01-19	Index for variation JTYPE* of element type; leave blank if ITYPE is 1,2,5, or 11	0
When	When ITYPE =	ຕິ = ຕິ	JTYPE = 1 JTYPE = 1 1	For contraction For E/T = 5 rectangular bars For L/T = 10 rectangular bars For round bars For L = 10 with slightly rounded For L = 0 with slightly rounded For L = 0 with slightly rounded	ATTENDED

TABLE C-1 (Continued). INPUT DATA DESCRIPTION

Variable Maximum Default Description Units name value value	L = 9.6 with tapered ends, $\overline{T}$ rectangular bars $\overline{L} = 5.0$ with rounded and tapered $\overline{T}$ edges	Indicator to read KTYPE* 0  in downstream cross-sectional data and dis- charge. Leave blank if no data is to be read. Put any positive integer if data is to be read. KTYPE can have a positive value only if ITYPE	or ISCND (C4) is 2) FOR ISCND = 1 (Prismatic section code) at downstream end of prismatic sections.	Invert elevation ft. 70 None	Height of channel ft. HT None or conduit. If open channel, put
		КТУР	FOR sect smati		
Units	apere r bar ounde			ft.	ft.
	with tangular	read nal nal de data de tive a tue E	) is 2 end o	tion	annel If put
otion		tor to astroad distributed of the control of the co	ND (C4	eleva	of ch duit. hannel
escri	For Tor	Indicator in downst cross-secdata and charge. blank if is to be Put any k integer is to be KTYPE car positive only if	r ISCI downs	nvert	eight r con
	F F	THE BECKET	0	Ι	H 0 0
Card columns	JTYPE =	71-80	is	1-10	11-20
Entry Format	'n	110		F10.4	F10.4
ry F		Н	KTY	Į.	Ēt.
Ent		ω	(Omit if KTYPE Cross-sectional	-	0
Card group		(cont)	D (Omit if KTYPE Cross-sectiona		

TABLE C-1 (Continued). INPUT DATA DESCRIPTION

Card	1	Entry Format	Card columns	Description	Units	Variable Maximum name value	Default value
	m	F10.4	21-30	Bottom width of channel or conduit.	ft. B	Ф	None
	a	F10.4	31-40	Side slope of channel or conduit.		SS	0.0
	72	F10.2	41-50	Discharge in channel or conduit.	cfs.	Œ	None
E (Omi	(Omit if KTYPE (Cross-sectional	TYPE (C8)	is zero	E (Omit if KTYPE (C8) is zero or ISCND (C4) is 1) FOR ISCND = 2 section code).  Cross-sectional properties at downstream end of circular sections.	.) f cire	FOR ISCND = 2 (Circular section code)	Ircular
	1	F10.4	1-10	Invert elevation.	ft. 20	02	0.0
	2	F10.4	11-20	Diameter of pipe.	ft.	Д	None
	ю	F10.4	21-30	Discharge in pipe.	cfs. Q	ď	None
El car	El card for ITYPE		11; omit otherwise	otherwise			
	1	110	1-10	Number of inverted siphons in parallel.		NS* 6	-
	2	F10.2	11-20	Total discharge in all siphons	cfs.	œ	None
	m	F10.4	21-30	Total of siphon entrance and exit loss coefficients		SS	1.50

TABLE C-1 (Continued). INPUT DATA DESCRIPTION

	Default value		None	None	None	None	None	None	None	None	llel may be r, only the tomatically
	Variable Maximum name value										nons in para same diamete Program au siphons.
	Variat name		¥	X	ft. SD(1)	ft. SD(2)	SD(3)	ft. SD(4)	ft. SD(5)	ft. SD(6)	e of annumber.
i	Vari Units name		ft. XL		ft.	ft.	ft.		ft.	ft.	nverte ons ar d be 1
	Description	= 11; omit otherwise	Total length of siphons	Manning's n	Diameter of first siphon	Diameter of second siphon	Diameter of third siphon	Diameter of fourth siphon	Diameter of fifth siphon	Diameter of sixth siphon	A maximum of six inverted siphons in parallel may be used. If all siphons are of same diameter, only the first diameter need be input. Program automatically assigns values to rest of the siphons.
1	Card columns	11; omit	1-10	11-20	21-30	31-40	41-50	21-60	61-70	71-80	
	Entry Format		F10.2	F10.4	F10.2	F10.2	F10.2	F10.2	F10.2	F10.2	
	0	E2 card for ITYPE	<b>1</b>	2	m	4	5	9	7	<b>&amp;</b>	Euska Euska
	Card	E2								- 34	n   E m

TABLE C-1 (Continued). INPUT DATA DESCRIPTION

18									
Default value		None	None	None	0.0	None		None	None
Variable Maximum name value	rwise.								
Variabl Units name	card for ITYPE = 2 and ISECN = 1 when JOBTP $\geq$ 1 For supercritical flow in conduits and channels; omit otherwise.	ft. 20	ft. HT	ft. B	ft/ft SS	cfs. Q		ft. 20	ft. D
	n JOBTP≥1 nd channels	Conduit or channel invert at upstream section		dth			= 2 and ISECN = 2 when JOBTP ≥ 1 al flow in pipes; omit otherwise.		
Description	= 2 and ISECN = 1 when JOBTP≥1 sal flow in conduits and channel	Conduit or invert at section	Conduit or channel height (use 99.0 for open channel)	Bottom width	Side slope	Discharge in conduit or channel	ECN = 2 when	Pipe invert at upstream section	Pipe diameter
Card	2 and ISI flow in	1-10	11-20	21-30	31-40	41-50	2 and ISI flow in	1-10	11-20
Entry Format	ITYPE = critical	F10.4	F10.4	F10.4	F10.4	F10.4		710.4	F10.4
	E3 card for ITYPE For supercriti			3	4	r.	E4 card for ITYPE For supercrition	1	2
Card	E3						<b>T</b> =		

None

ft. Q

Discharge in pipe

21-30

F10.4

TABLE C-1 (Continued). INPUT DATA DESCRIPTION

		1					
Default value		contrac	None	None	None	0.0	None
Maximum value		se (bends		<b>,</b>			
Variable Maximum name value		t otherwi ion)	02	HT	м	SS .	G,
Units		omi	ft.	ft.	ft.	ft.	cfs.
Description U	Card F contains data for upstream section for the particular element in the flow path. Altogether there are seven types of elements that this program can handle. These seven types of F cards will now be explained	= 1,3, or 5 and ISECN (C5) = 1; omit otherwise (bends, contracsions, and outfalls) (Prismatic section)	Channel invert	Height of channel (for open channel use 99.0)	Bottom width of channel	Side slope of channel	Discharge in channel
Card columns		= $1,3$ , or 5 sions, and on	1-10	11-20	21-30	31-40	41-50
Entry Format			F10.4	F10.4	F10.4	F10.4	F10.2
10		card when ITYPE tions and expan	-	N	m	7	2
Card	()* - 11 - 10 - 10 - 10	F care					

TABLE C-1 (Continued). INPUT DATA DESCRIPTION

Grand	Entry For	Format	Card columns	Card columns Description	Varia Units name	Variable name	Variable Maximum Default name value value	Default value
F (cont)	9	F10.4	51-60	Loss coefficient (leave blank if ITYPE = 5)		CB		1.10 for bend 1.00 for ex- pansion 0.50 for con-

F card when ITYPE (C6) = 1,3, or 5 and ISECN (C5) = 2; omit otherwise (bends, contractions and expansions, and outfalls) (Circular section)

0.0	None	None	1.10 for bend 1.00 for ex- pansion 0.50 for con- traction
ft. 20	ft. D	cfs. Q	B. S. S.
Pipe invert	Pipe diameter	Pipe discharge	Loss coefficient (leave blank if ITYPE = 5)
1-10	11-20	21-30	31-40
F10.4	F10.4	F10.4	F10.4
1	8	m	a

F card when ITYPE (C6) = 2; omit otherwise (pipe, conduit, and channel)

None	0.0	None
ft. XL	ft/ft. SO	NX
Length of pipe, conduit, or channel	Slope	Manning's n to be used
1-10	11-20	21-30
F10.2	F10.6	F10.4
	2	m

TABLE C-1 (Continued). INPUT DATA DESCRIPTION

	Default value	None		None	None		None	90.0	None	None	Yes Program will compute appropriate value if this field is left blank
	Variable Maximum l name value	Access to your and a second of the second of									
בי ידווסר	Variab name	* SIN		02	HT		В	SS	ď	Bl	S
OI DAIN DEN	Units	segments ation	screen)	ft.	nel; ft.		ft.	ft/ft.	cfs.	f ft.	ent
IABLE C-1 (CONCINCE). IN CLUAIN DESCRIPTION	Description	Number of segme for computation and printout	4; omit otherwise (bar screen)	Channel invert	Height of channel; for open channel	nse 99.0	Bottom width	Side slope	Discharge	Total width of bars	Loss coefficient
7 (CO	Card	31-40	4; omit o	1-10	11-20		21-30	31-40	41-50	21-60	61-70
IADL	Entry Format	110	F card when ITYPE =	F10.4	F10.4		F10.4	F10.4	F10.4	F10.4	F10.4
	Entry	#	when	1	2		3	4	2	9	7
	Card group	F (cont)	F card								

TABLE C-1 (Continued). INPUT DATA DESCRIPTION

Card		Entry Format	Card	Description	Vari	Variable Maximum name value	Default value
р В	75		6 and ISE( (Prismatic	otherw		opera utors	uch as pumps, measuring
	н	F10.4	1-10	Channel or conduit invert	ft. 20	02	None
	N	F10.4	11-20	Channel or conduit height (use 99 if open channel)	ft. HT	HT	None
	3	F10.4	21-30	Bottom width	ft.	Д	None
	4	F10.4	31-40	Side slope f	ft/ft.	SS	0.0
	Z.	F10.4	41-50	Discharge	cfs.	ď	None
	9	F10.4	21-60	Rated discharge	cfs.	QR	None
	7	F10.4	61-70	Rated head loss; negative value for pump head	ft.	ft. RHLOS	None
F Ca	F card when ITYPE	1	6 and ISE (Circular	6 and ISECN = 2; omit otherwise (Circular section)		<pre>(unit operations, comminutors, flow devices, etc.)</pre>	such as pumps, measuring
	1	F10.4	1-10	Pipe invert	ft. Z0	20	None
	2	F10.4	11-20	Pipe diameter	ft.		None
	m	F10.4	21-30	Discharge	cfs. Q	ď	None

INPUT DATA DESCRIPTION TABLE C-1 (Continued).

11	3	Select in
Default value	None	None
Variable Maximum Default name value value		vario as
Variable name	QR	ft. RHLOS
Varia Units name	cfs. QR	ft.
Card columns Description	Rated discharge	Rated head loss; negative value for pump head
Card	31-40	41-50
Entry Format	F10.4	F10.4
Entry	4	5
Card	E	(couc)

F card when ITYPE = 11 and ISECN = 1; omit otherwise (siphons with open channel or conduit upstream)

None	None	None	0.0
ft. 20	ft. HT	ft. B	ft/ft. SS
Upstream channel ft. ZO or conduit invert	Channel or conduit ft. HT height (use 99 for open channel)	Bottom width	-40 Side slope ft/ft. SS
10.4 1-10	10.4 11-20	10.4 21-30	10.4 31-40
F10.4	F10.4	F10.4	F10.4
	2	8	<b>a</b>

F card when ITYPE = 11 and ISECN = 2; omit otherwise (siphons with pipe upstream)

None	None
ft. Z0	ft. D
Pipe invert	Pipe diameter
1-10	11-20
F10.4	F10.4
1	8

Cards C through F must be repeated in sequence for every element in flow path from Only one F card is required for each element in the flow downstream to upstream. Only one F car path. Select correct F card carefully. Notes: path.

For junctions use contraction index for entrance and expansion index for inlet and junction box width = 99.0.

For sections at which invert drops suddenly use outfall index. 3.5

Several jobs can be processed in a single computer run by separating two jobs by placing a single blank card between them.

Numbers must be right justified,

Where, hbar = head loss in feet.

V = approach velocity before the bar screen, ft/sec.

K = head loss coefficient.

The head loss coefficient K is a function of the ratio of area of bars to area of flow cross-section and the shape of the bars. Loss coefficients for various shapes of bars have been determined experimentally and are presented in Hydraulic Design Criteria Design Chart 010-7, Corps of Engineers\*.

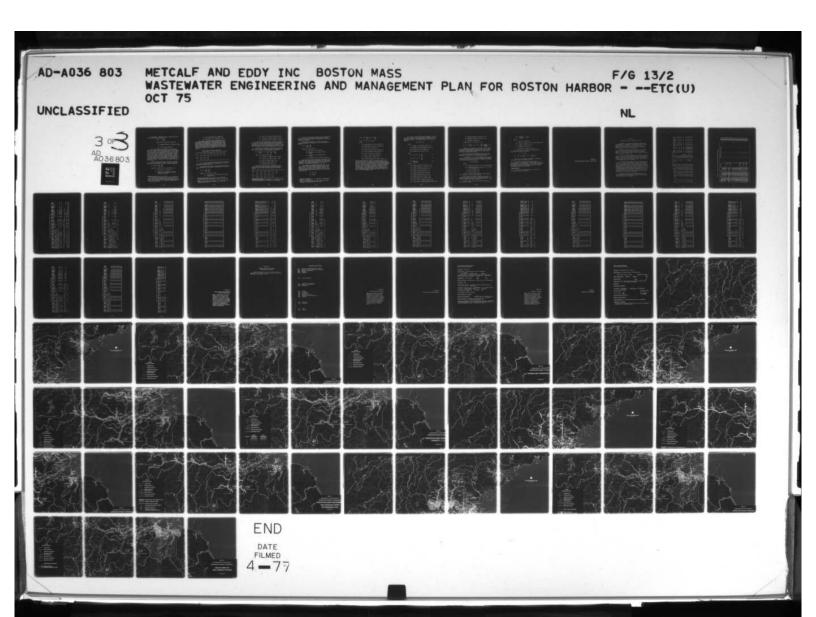
Design chart 010-7 presents loss coefficient curves for six types of bar screens. Third order polynomial equations for loss coefficients were fitted through each of these curves and are used in the program. These equations are given below:

$$K = 0.834 A_r + 3.900 A_r^2 + 6.920 A_r^3$$
 For Type 1  
 $K = 0.760 A_r + 1.689 A_r^2 + 7.340 A_r^3$  For Type 2  
 $K = 0.031 A_r + 6.800 A_r^2 + 0.514 A_r^3$  For Type 3  
 $K = 0.209 A_r + 4.790 A_r^2 + 1.910 A_r^3$  For Type 4  
 $K = -0.0895 A_r + 3.266 A_r^2 - .869 A_r^3$  For Type 5  
 $K = 0.668 A_r - 2.081 A_r^2 + 8.496 A_r^3$  For Type 6

In the above equations K is the loss coefficient and Ar is the ratio of area of bars to total area of cross-section.

The Bar Screen subroutine uses the loss coefficients calculated from the appropriate equation above. The user can use the coefficients determined by the program or can use his own coefficients. If the user leaves the input field for bar loss coefficient blank, the program will calculate the appropriate loss coefficient. However, if the user puts in a value for loss coefficient that value will be used by the program.

<sup>\*</sup>Corps of Engineers-Hydraulic Design Criteria, U.S. Army Waterways Experiment Station, Vicksburg, Mississippi.



Bend losses. Head loss in pipe, conduit, and open channel bends can be expressed as:

 $^{h}$ bend =  $K_{b} \frac{\overline{V}^{2}}{2g}$ 

Where head = head loss in bend, ft.

 $\overline{V}$  = average velocity in the bend, ft/sec.

K<sub>b</sub> = bend loss coefficient.

The coefficient  $K_b$  is a function of the type of bend (e.g., miter bends, long radius bends, short radius bends, etc.) and also the type of flow such as open channel or closed conduit. A loss coefficient  $K_b$  = 1.10 is used in the computer program assuming that the bend is a miter bend (abrupt bend). For bends other than miter bends the user has to choose the correct loss coefficient. Curves for bend loss coefficients for different types of bends have been developed from experimental data and are presented in design charts 228-1, 228-2, 228-2/1 of the Corps of Engineers Hydraulic Design Criteria\*\*. These charts may be used as a guide to determine the appropriate bend loss coefficients.

Closed Conduit Contraction. Head loss in contractions from closed conduit to closed conduit or from open channel to closed conduit flows can be expressed\*\*\* as:

$$H_{L} = (\frac{1}{C_{c}} - 1)^{2} \frac{V^{2}}{2g} = \frac{KV^{2}}{2g}$$

Where,  $H_L$  = head loss due to contraction, ft.

 $C_c$  = coefficient of contraction

V = velocity in the smaller of the two conduits or the larger of the two velocities, ft/sec.

<sup>\*&</sup>quot;Steady Flow in Pipes and Conduits", V.L. Streeter, Ch. IV. Engineering Hydraulics, Ed. H. Rouse, pp. 413-415.

\*\*Corps of Engineers - Hydraulic Design Criteria, U.S. Army Waterways Experiment Station, Vicksburg, Mississippi.

\*\*\*King, H.W., & Brater, E.F., "Handbook of Hydraulics" pp. 8-31 (fifth ed.).

K = loss coefficient for contraction

g = acceleration due to gravity, ft/sec.

The computer program can supply appropriate loss coefficients or the user may decide to use his own loss coefficient for contraction. If the user decides not to use his own loss coefficient, the field for loss coefficient on the input data card should be left blank. The program will then calculate the appropriate loss coefficient based on the ratio of the areas of the two conduits. The loss coefficients are calculated from the following table.\*

## COEFFICIENTS FOR SUDDEN CONTRACTION

A <sub>2</sub> /A <sub>1</sub>	0.0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	
K	0.50	0.48	0.45	0.41	0.36	0.29	0.21	0.13	
A <sub>2</sub> /A <sub>1</sub>	0.80	0.90	1.00						
K	0.07	0.01	0.00						

If the loss coefficient computed from the above table comes out to be less than 0.10, the program uses a contraction loss coefficient of 0.10.

Open Channel Contraction. The expression for head loss computation in open channel contraction can be written\*\* as:

$$H_{L} = K_{c} \quad (V_{\frac{2}{2g}}^{2} - V_{\frac{1}{2g}}^{2})$$

Where, H<sub>T</sub> = head loss in feet.

<sup>\*&</sup>quot;Steady Flow in Pipes and Conduits", V.L. Streeter, Ch. VI, Engineering Hydraulics, H. Rouse, Ed., pp. 413-415.

<sup>\*\*</sup>Channel Transitions and Controls, A. T. Ippen, Ch. VIII, Engineering Hydraulics, H. Rouse, Ed., pp. 514-519.

V2 = velocity in smaller channel, ft/sec.

V<sub>1</sub> = velocity in larger channel, ft/sec.

g = acceleration due to gravity, ft/sec.<sup>2</sup>

In the case of open channel contraction, the user has to supply his own loss coefficient or else the program assumes that the open channel contraction is abrupt, and, therefore, uses the abrupt contraction coefficient of 0.50. For gradual open channel contracting loss coefficients the user is referred to open channel hydraulics by V. T. Chow.

Closed Conduit Expansion. Head loss in expansion from closed conduit to closed conduit or from closed conduit to open channel can be expressed\* as follows:

$$H_{L} = \frac{V_{1}^{2} - V_{2}^{2}}{2g} = (1 - \frac{A_{1}}{A_{2}})^{2} \quad \frac{V_{1}^{2}}{2g} = K \quad \frac{V_{1}^{2}}{2g}$$

Where, H<sub>T.</sub> = head loss in feet.

V<sub>1</sub> = velocity in smaller conduit ft/sec.

V2 = velocity in larger conduit 1 /sec.

A, = area of smaller conduit ft.<sup>2</sup>

A<sub>2</sub> = area of larger conduit ft.<sup>2</sup>

K = expansion loss efficient.

The program will calculate an appropriate loss coefficient if the user leaves the input data field for expansion loss coefficient blank using the following table:

A <sub>1</sub> /A <sub>2</sub>	0.00	0.10	0.20	0.30	0.40	0.50
K	1.00	0.81	0.64	0.49	0.36	0.25
A <sub>1</sub> /A <sub>2</sub>	0.60	0.70	0.80	0.90	1.00	
K	0.16	0.09	0.04	0.01	0.00	

<sup>\*</sup>Steady Flow in Pipes and Conduits, V. L. Streeter, Ch. VI, Engineering Hydraulics, H. Rouse, Ed., pp. 413-415.

If the loss coefficient computed from the above table is less than 0.20, the computer program uses for design purposes a minimum value of 0.20. Optionally the user may choose his own value.

Open Channel Expansion. The head loss in open channel enlargements or expansions can be expressed\*, \*\* as follows:

$$H_{L} = K_{e} \left( \frac{V_{1}^{2}}{2g} - \frac{V_{2}^{2}}{2g} \right)$$

Where, H<sub>T</sub> = Head loss, ft.

K = Expansion loss coefficient

V<sub>1</sub> = Velocity in the smaller section, ft/sec.

V<sub>2</sub> = Velocity in the larger section, ft/sec.

g = Acceleration due to gravity, ft/sec.<sup>2</sup>

The user must choose an expansion coefficient or else the program will assume that the expansion is abrupt and, therefore, will use a loss coefficient of 1.00 for sudden expansion. For gradual open channel expansion the user is referred to open channel hydraulics by V. T. Chow.

Pipe, Conduit, and Open Channel Outfalls. In the case of an outfall the program assumes that the velocity head,  $V^2/2g$ , of the flow is lost entirely when the flow leaves the pipe, conduit or open channel. Also, it is assumed that the flow velocity below the outfall is zero. Thus, the energy relation above and below the outfall can be written as:

$$E_1 = E_2 + h_e$$
  
 $h_e = V_1^2/2g$ 

<sup>\*</sup>King, H. W. & Brater, E. F., "Handbook of Hydraulics", pp. 8-31 Fifth Ed.

<sup>\*\*</sup>Hinds, J., "The Hydraulic Design of Flume and Siphon Transition, Trans, ASCE, Vol. 92, 1928.

or 
$$Z_1 + Y_1 + \frac{V_1^2}{2g} = Z_2 + Y_2 + \frac{V_1^2}{2g}$$
  
or  $Z_1 + Y_1 = Z_2 + Y_2 = HGL_2$   
Where,

E, = Energy grade line above outfall, ft.

E<sub>2</sub> = Energy grade line below outfall, ft.

he = Head loss in outfall, ft.

 $Z_1$  = Invert elevation above outfall, ft.

Z<sub>2</sub> = Invert elevation below outfall, ft.

 $Y_1$  = Depth of flow above outfall, ft.

Y = Depth of flow below outfall, ft.

 $V_1$  = Velocity above outfall, fps.

HGL<sub>2</sub> = Hydraulic Grade Line below outfall, ft.

The hydraulic grade line below the outfall is known. The depth of flow above the outfall on then calculated directly. However, if there is a discontinuity in the hydraulic profile due to a drop then the above relation would not be applicable. In such a case, the depth of flow above the outfall would be equal to the critical depth in the pipe, conduit of channel for that flow. The program, therefore, checks to see whether there is any discontinuity in the hydraulic profile and calculates the correct depth of flow. The velocity of flow is calculated from the continuity equation  $(A_1V_1=Q)$ , where Q is the discharge in cfs.

Head Loss in Pipes, Conduits, and Channels. Head loss in a pipe, conduit, or channel segment of length  $\Delta X$  is computed on the basis of the energy relation between the two ends of the segment. The energy relation can be written as follows:

$$E_1 = E_2 + S_f \Delta X \tag{1}$$

where,

E, = Energy at the upstream section, ft.

E<sub>2</sub> = Energy at the downstream section, ft.

 $S_f \Delta X$  = Head loss in the segment,  $\Delta X$ 

S<sub>f</sub> = Average friction slope, ft/ft.

also,

$$E_1 = Z_1 + Y_1 + \alpha_1 \frac{V_1^2}{2g}$$
 (2)

$$E_2 = Z_2 + Y_2 + \alpha_2 \qquad \frac{V_2^2}{2g} \tag{3}$$

$$\bar{S}_{f} = \frac{n^2 \bar{v}^2}{2.22 \bar{R}^{4/3}} \tag{4}$$

where,

Z, = Invert elevation at section 1, ft.

Z<sub>2</sub> = Invert elevation at section 2, ft.

Y, = Depth of flow at section 1, ft.

Y2 = Depth of flow at section 2, ft.

 $\alpha_1$  = Energy coefficient at section 1

a2 = Energy coefficient at section 2

 $V_1$  = Mean velocity at section 1, fps.

V<sub>2</sub> = Mean velocity at section 2, fps.

 $\overline{V} = (V_1 + V_2)/2 = \text{Average velocity, fps.}$ 

 $\bar{R} = (R_1 + R_2)/2 = \text{Average hydraulic radius, ft.}$ 

R, = Hydraulic radius at section 1, ft.

R2 = Hydraulic radius at section 2, ft.

n = Manning's Coefficient

Introducing (2), (3), and (4) in (1).

$$z_1 + y_1 + \alpha_1^1 \frac{v_1^2}{2g} = z_2 + y_2 + \alpha_2 \frac{v_2^2}{2g} + \frac{n^2 \overline{v}^2 \Delta x}{2 \cdot 2^2 \overline{R}^4 / 3}$$
 (5)

Equation (5) is solved by successive trials together with the continuity equation  $(A_1V_1=A_2V_2)$ . In the PHP program, the Newton-Raphson successive iteration technique is employed to solve for  $Y_1$  and  $V_1$  when  $Y_2$ , and  $V_2$  are known for the downstream section.

In case of Pipes and Conduits flowing full, flow properties at either end of the segment are known and the solution of equation (5) can be obtained directly.

Unit Operations. Head losses through flow measuring devices, comminutors, etc., and head additions for pumps on the flow path are computed by the unit operations by using the following functional relation:

$$H_{L} = RH_{L} (Q/Q_{R})^{2}$$
 (1)

Where,

H<sub>T.</sub> = Head loss or addition in ft. for discharge Q.

 $\mathrm{RH}_{L}$  = Rated head loss or addition in ft. for the rated discharge  $\mathrm{Q}_{\mathrm{R}}.$ 

Q = Actual discharge, cfs.

Q<sub>R</sub> = Rated discharge, cfs.

In case of pumps on flow line  ${\tt RH}_L$  becomes negative and, therefore,  ${\tt H}_L$  also become negative.

Grit Chambers and Chlorine Chambers. Head loss and hydraulic profile computations for grit chambers and chlorine chambers are done as open channel segments, details of which are presented under Section 8.

Siphons. Head loss  $h_{\rm LS}/{\rm in}$  an inverted siphon is calculated as follows:

$$h_{es} = \frac{n^2 v^2 L}{2.22 R^{4/3}} + h_L \frac{v^2}{2g}$$

Where,

n = Manning's coefficient

h, = Total of entrance and exit loss coefficients

L = Length of siphon pipe, ft.

R = Hydraulic radius, ft.

V = Velocity in siphon pipe, fps.

The energy relation between the downstream and upstream of the siphon is given as:

$$E_1 = E_2 + h_{es}$$
  
or,  $Z_1 + Y_1 + \frac{V_1^2}{2g} = Z_2 + Y_2 + \frac{V_2^2}{2g} + h_{Ls}$ 

Equation above is solved together with continuity equation by trial to determine  $\mathbf{Y}_1$  and  $\mathbf{V}_1$ .

When there are more than one siphon pipes in parallel first the distribution of flow between the pipes are determined by the requirement that the head loss through each siphon pipe will be the same. For details of flow distribution between parallel pipes the user is referred to Fluid Mechanics by V. L. Streeter.

## Program Listing

A listing of the PHPA Program is on file at the Metropolitan District Commission.

APPENDIX D

INTERCEPTOR MODELING EXAMPLE AND RESULTS

#### APPENDIX D

### INTERCEPTOR MODELING EXAMPLE AND RESULTS

An example of interceptor modeling is presented in this appendix to illustrate the application of the instructions presented in Appendix C to an actual problem. For purposes of this example Sections 132 and 133B of the South Metropolitan System were selected (see Interceptor Modeling Package No. S-16 in Appendix B).

Table D-1 presents data pertaining to the physical system (extracted from Appendix A) used in the example problem. The capacities of each interceptor section as shown in this table were obtained from the computer analysis output presented in Table D-3.

Table D-2 presents the data shown in Table D-1 in the format in which it must be coded for input to the computer program. This was done in accordance with the user instructions as presented in Appendix C. The user instruction card designations are given along the right side of Table D-2 to permit easy review of the example.

The results of the computer run which are presented in Table D-3 reflect the actual flow conditions that occur within the existing physical system based on present peak flows as calculated during the flow quantification analysis (See Technical Data Vol. 2). This data is used to determine whether relief of the existing system is required. If such is found to be the case, relief pipes are sized based on the difference between peak design flow and system capacity. In this particular case, the hydraulic grade line (El 211.24) at station 5+87.00 in Section 132 is shown above the crown of the pipe (El 209.92), thus indicating that the sewer is surcharged and that relief is required.

The input data, card listings and results of the computer analysis for the North and South MSD systems are not contained within this report, but are on file with the Metropolitan District Commission.

TABLE D-1 INTERCEPTOR DATA USED FOR MODELING EXAMPLE

SECT	NO LOC STATION	FROM	(F.P.)	STATION	INVERT (FT)	S12E (1N)	SHAPE	(FT)	SLOPE	(SOFT)	ZZZ	APEA MANN CAPACITY (SOFT) N (CFS) (MGD)	(MGD)
132	FAX	0 • 0 • 0	204.80	4+70.00 205.12	205.12	•	CIRCULAR	466.00	466.00 0.000687	12.57 .013	•013	37.78	24.42
132	TAN	4+70.00	205.12	5+87.00 205.92	205.92	2-27	SIPHON	117.00		7.96	7.96 .013	34.51	22.31
132	TAN	5+87.00	205.92	69+20.98 210.29	210.29		CIRCULAR	6333.98	6333.98 0.000689	12.57 .013	•013	37.78	24.42
132	TAN	69+20-98	210.29	71+45.98 211.53	211.53	2-27	NOHAIS	225.00		8.	7.96 .013	36.10	23.34
132	TAN	71.45.98	211.53	71+92.00 211.57	211.57	•	CIRCULAR	46.02	0.000869	12.57 .013	.013	42.43	27.42
132	TAN	11+92.00	211.57	71+92.00 220.47	220.47		DROP MANHOLE						
132	747	11+92.00	220.47	79+82.00 221.00	221.00	8	CIRCULAR	190.00	790.00 0.000670	12.57 .013	.013	37.29 24.10	24.10
132	TAN	79+82.00	221.00	79+82.00 224.72	224.72		DROP MANHOLE						
132	TAN	79+82.00	224.72	224.72 104+80.73 226.45	226.45		CIRCULAR	2498.73	2498.73 0.000692	12.57 .013	.013	37.86	24.47
1338	TAN	00.00+0	226.45	17+27-53 227-64	227.64	•	CIRCULAR	1727.53	1727.53 0.000688	12.57 .013	.013	37.78	24.42
1338	TAN	17+27.53	227.64	72+13.01	231.43	+8×8+	EXT. CIRCLE	5485.48	5485.48 0.000690	14.57 .013	.013	11.94	29.80
1 338	TAN	72+13.01	231.43	96+24.71 232.74	232.74	*8X8*	EXT. CIRCLE	2411.70	2411.70 0.000543	14.57	14.57 .013	40.95	26.47
1 338	TAN	96+24.71	232.74	232.74 100+90.00 233.06	233.06	*2	CIRCULAR	465.29	465.29 0.000687	9.62	9.62 .013	26.46 17.10	17.10
1336	TAN	100+00+001	233.06	233.06 130+87.56 235.13	235.13	•	CIRCULAR	2997.57	2997.57 0.000690	12.57	12.57 .013	37.78	24.42

TABLE D-2 INPUT DATA FOR INTERCEPTOR MODELING EXAMPLE

	-	1						•			•	-						
AND 1338	۵												-		٥		,	
SECTIONS 132 A	8	N			a	11		C)	·	v	N	N	E	8	a m	o 01	М	N
SEC	N	N	8		8	N		2	,	v	N	Q	N	83	0 0	1 0	~	8
ALAM	N	-0	132 2	2.25	24	132 2	2.25	N	<b>-</b> - (	v	40	12	1338 2	22.2	12 12 12 12 12 12 12 12 12 12 12 12 12 1	1.00	1338 2	15
ABU	1	•••	60.51 .013 SECTION	2.25	132	SE	2.25	-		60.51	• 0		013 .TION SEC.		133B 013	33		47.99 1 1338 0 13
IB SEW & INT	7.00 SECTION	.000686 .000686	• 1-	60.51 .013	6.0	S.98 SIPHON	0000	12.00 SECTION	000869	4.00	.000670 -80.7 SECTION	.000692 7.53 SECTION	RA	3.01 SECTION	24.71 SECTION 1 .000543 .0	3.50 90.0 SECTION	+90.0 CONTRAC	400
2568 MDC COMB	0+04.00 2+47	243.00 2447.00 4+7	204.97 223.00 4+70.00 5+8		+	+	225.00	+		ř	4	2498.73	1727.53	17+27-53 72+1	1964	74	00	233.06 100+90.0 130+87 2997.57 .0

4  $\pm$  0 0  $\pm$  0 0  $\pm$  0 0  $\pm$  0  $\pm$ 

TABLE D-3 (CONTINUED) OUTPUT FROM INTERCEPTOR MODELING EXAMPLE

INVERT B. WIDTH SIDE FLOW MANNING LOSS DEPTH HYDRA. FLOW VELOCITY VELOCITY WATER ENERGY HEAD LOSS ELEV. OR DIAM. SLOPE CFS. COEF. COEF. OF FLOW RADIUS AREA FPS. HEAD SURFACE GRADE LOSS FT.	1 LENGTH OF SEGMENT = 223,00 FT.			7.00 WITH CHANNEL- FLOW	1.	28 5.36 0.4468 208.3406 208.7874 0.0007	0.00 WITH CHANNEL- FLOW	98 5.04 0.3955 208.7526 209.1482 0.3607		2.2500 FT. DIAMETER INVERTED SIPHONS IN PARALLEL. FLOW PROPERTIES IN EACH PIPE AS BELOW &	97 7.60 0.8990 2.4590		7.00 WITH PIPE FLOW
FLOW AREA SQ.FT.				2+47	3410 F	11.26	4+70	11.9	+87.00	LOW PR	3.97	6487.00	0
RADIUS FT.	NO. OF SEGMENTS = 1			AT STATION 2+47.00	C = 2.	3.37 1.21 11.28	AT STATION 4+70.00	3.62 1.18 11.98	AT ION 5	ALLEL. FI	2.25 0.56	NOTTATE TA CEL	
EPTH FLOW FT.	NO. OF	4.0000 FT.		AT	т. ч	3.37	AT	3.62	ST	IN PAR	2.25	AT S	
MANNING LOSS COET. OF	SLOPE = 0.000686	NORMAL DEPTH IN CHANNEL , CONDUIT , OR PIPE YN = CONDUIT OR PIPE FULL CAPACITY GFULL = 37.70 CFS	BOTTOM SLOPE LESS THAN CRITICAL SLOPE SC = 0.004212	FLOW PROPERTIES DOWNSTREAM OF SECTION 132	END LARGER THAN CRITICAL DEPTH , YC = 2.3410 FT.	60.51 0.0130	FLOW PROPERTIES UPSTREAM OF SECTION 132	60.51 0.0130	SIPHON SECTION 132 BETWEEN STATION 4+70.00 AND STATION 5+87.00	ER INVERTED SIPHONS	5	FLOW PROPERTIES UPSTREAM OF SIPHON SECTION 13	
FLOW CFS.	SLOP	ONDUIT TY OF U	ICAL S	M OF	D LARG	60.5	OF	60.5	EN ST	DIAMET	30.25	OF	
SIDE SLOPE HR/VI	223.00 FT.	L CAPACI	THAN CRIT	OWNSTREAM			IPSTREAM-		12 BETWEE	500 FT. (		IPSTREAM-	
B. WIDTH OR DIAM.	223.0	IN CHA	LESS T	IES D	DOWNS	4.00	IES U	4.00	2 2	2.25	2.25	IES U	
B OR	"	DEPTH OR PI	SLOPE	ROPERT	PTH AT		ROPERT		SECT 10	1		ROPERT	
INVERT ELEV. FT.	LENGTH	NORMAL	BOTTOM	FLOW P	FLOW DEPTH AT DOWNSTREAM	204.97	FLOW P	205-12	SIPHON	2		FLOW P	

TABLE D-3 OUTPUT FROM INTERCEPTOR MODELING EXAMPLE

SECTION 132  LENGTH = 243.00 FT. SLOPE = 0.000686  NO. OF SEGMENTS = 1  NORMAL DEPTH IN CHANNEL, CONDUIT, OR PIPE YN = 4.0000 FT.  CONDUIT OR PIPE FULL CAPACITY OFULL = 37.70 CFS  BOTTOM SLOPE LESS THAN CRITICAL SLOPE SC = 0.004212  FLOW PROPERTIES DOWNSTREAM—OF SECTION 132  AT STATION 0+04.00	7.00 = 1 LENGTH OF SEGMENT = 243.00 FT.
2 4 >	LENGTH OF SEGMENT =
Ž d	LENGTH OF SEGMENT =
4 >	
004212	
DENCTORAN FOUND CONTICAL DEDTH . VC = 2.3410 ET.	0 WITH CHANNEL- FLOW
בייניייי בייני בפטרט פעווייפיר מרביייי	
4.00 60.51 0.0130 2.34 1.09 7.63	7.92 0.9742 207.1410 208.1153 3.1152
FLOW PROPERTIES UPSTREAM OF SECTION 132 AT STATION 2+47.00	D WITH CHANNEL- FLOW
4.00 60.51 0.0130 3.37 1.21 11.28	5.35 0.4460 208.3406 208.7867 0.6714

TABLE D-3 (CONTINUED) OUTPUT FROM INTERCEPTOR MODELING EXAMPLE

HEAD LOSS FT					-0.0000	0.3298	0.3298	0.3298	0.3298	0.3298	0.3298	0.3298	0.3298
ENERGY GRADE FRE. TT.	186.88 FT.												
**************************************	MENT.			PIPE FLOW	0.3600 211.2471 211.6072	0.3600 211.5769 211.9370	0.3600 211.9068 212.2668	0.3600 212.2366 212.5967	0.3600 212.5664 212.9265	0.3600 212.8963 213.2563	0.3600 213.2261 213.5862	0.3600 213.5560 213.9160	0.3600 213.8858 214.2458
ELOCITY HEAD FT	LENGTH OF SEGMENT			PIPE	0.3600	0.3600	0.3600	0.3600	0.3600	0.3600	0.3600	0.3600	0.3600
VELOCITY VELOCITY FPS. FT.	LENGT			WITH	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81
**************************************	+20.98			5+87.00	12.56	12.56	12.56	12.56	12.56	12.56	12.56	12.56	12.56
######################################	STATION 69+20.98			STATION	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
######################################			12	¥ ¥	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
LOSS COEF.	5+87.00 AND	7.78 CF	0.004212	132									
######################################	0	80 II	SPE SC =	M OF SECTION	60.51 0.0130	60.51 0.0130	60.51 0.0130	60.51 0.0130	0.0130	0.0130	0.0130	0.0130	60.51 0.0130
* * * * * * * * * * * * * * * * * * *	SLOPE =	ONDUIT TY OFUL!	TICAL SLOPE SC	M 0F	19.09	60.51	60.51	60.51	15.09	60.51	16.09	60.51	60.51
***** SLOPE SLOPE HR/VT *****	TWE	NEL . C	AN CRIT	WNSTREA									
**************************************	BE 6353.98 FT.	NORMAL DEPTH IN CHANNEL . C	BOTTOM SLOPE LESS THAN CRIT	FLOW PROPERTIES DOWNSTREA	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	206.95 4.00
m o	132	DEP TH	SLOPE	ROPER									
**************************************	SECTION 132	CONDUIT	BOTTOM S	LOW PF	2000.92	206.04	206.17	206.30	206.43	200.56	206.69	206.82	206.95

TABLE D-3 (CONTINUED) OUTPUT FROM INTERCEPTOR MODELING EXAMPLE

# INVER# # FT.	##************************************	SIDE SLOPE HR/VI	######################################	* * * * * * * * * * * * * * * * * * *	LOSS COEF.	****** DEPTH OF FLOW	HYDRA RADIUS	* * * * * * * * * * * * * * * * * * *	VELOCITY FPS.	**************************************	WATER SURFACE	ENERGY GRADE ELE. FT.	HEAD LOSS
207.07	4.00		60.51	0.0130		00.4	1.00	12.56	4.81	0.3600	0.3600 214.2156 214.5757	214.5757	0.3298
207.20	4.00		60.51	0.0130		4.00	1.00	12.56	4.81	0.3600 2	214.5455	214.9055	0.3298
207.33	4.00		60.51	0.0130		4.00	1.00	12.56	4.81	0.3600 2	214.8753	215.2353	0.3298
207.46	4.00		60.51	0.0130		00.4	1.00	12.56	4.81	0.3600	0.3600 215.2051	215.5652	0.3298
207.59	4.00		19.09	0.0130		4.00	1.00	12.56	4.81	0.3600 2	215.5350	215.8950	0.3298
201.72	4.00		60.51	0.0130		4.00	1.00	12.56	4.81	0.3600	215.8648 216.2248	216.2248	0.3298
207.85	4.00		60.51	0.0130		4.00	1.00	12.56	4.81	0.3600 2	0.3600 216.1946 216.5547	216.5547	0.3298
207.98	4.00		60.51	0.0130		4.00	1.00	12.56	4.81	0.3600	0.3600 216.5245 216.8845	216.8845	0.3298
208.10	4.00		60.51	0.0130		4.00	1.00	12.56	4.81	0.3600 2	0.3600 216.8543 217.2143	217.2143	0.3298
208.23	4.00		60.51	0.0130		4.00	1.00	12.56	4.81	0.3600 2	0.3600 217.1841	21.7.5442	0.3298
208.36	4.00		60.51	0.0130		4.00	1.00	12.56	4.81	0.3600 2	217.5140	217-8740	0.3298
208.49	4.00		60.51	0.0130		4.00	1.00	12.56	4.81	0.3600	217.8438	218.2038	0.3298
208.62	4.00		60.51	0.0130		4.00	1.00	12.56	4.81	0.3600 2	218.1736	218-5337	0.3298
208.75	4.00		60.51	0.0130		00.4	1.00	12.56	4.81	0.3600 2	218.5035	218-8635	0.3298
208.88	4.00		60.51	0.0130		00.4	1.00	12.56	4.81	0.3600 2	0.3600 218.8333	219-1933	0.3298
203.01	4.00		60.51	0.0130		4.00	1.00	12.56	4.81	0.3600	0.3600 219.1631 219.5232	219.5232	0.3298
*******	*****************	******	*****	*******	******	********	********	*******	********	********	*******	<b>这种故障的非常是这种的,他们也是有一个,他们的,他们们们的,他们们们们的,他们们们们的,他们们们们的,他们们们们们们们的,他们们们们们们们们</b>	******

TABLE D-3 (CONTINUED) OUTPUT FROM INTERCEPTOR MODELING EXAMPLE

F I.	SLO	COEF	COEF	OF FLOW	RADIUS FT.	AREA SQ.FT.	VELOCITY FPS.	VELOCITY HEAD FT.	SURFACE ELE. FT.		LOSS
20 3 - 13 4 - 00		· · · · · · · · · · · · · · · · · · ·		00.4	1.00	12.56	4.81	0.3600	4.81 0.3600 219.4930 219.8530	219.6530	0.3298
4.00	60.5	60.51 0.0130		4.00	1.00	12.56	4.81	0.3600	0.3600 219.8228 220.1828	220.1828	0.3298
4.00	60.5	60.51 0.0130		4.00	1.00	12.56	4.81	0.3600	0.3600 220.1526 220.5127	220.5127	0.3298
4.00	60.51	1 0.0130		4.00	1.00	12.56	4.81	0.3600	0.3600 220.4825 220.8425	220.8425	0.3298
4.00	60.5	60.51 0.0130		4.00	1.00	12.56	4.81	0.3600	0.3600 220.8123 221.1723	221.1723	0.3298
4.00	60.5	60.51 0.0130		4.00	1.00	12.56	4.81	0,3600	0.3600 221.1421 221.5022	221.5022	0.3298
4.00	60.5	60.51 0.0130		4.00	1.00	12.56	4.81	0.3600	0.3600 221.4720 221.8320	221.8320	0.3298
4.00	60.5	60.51 0.0130		4.00	1.00	12.56	4.81	0.3600	0.3600 221.8018 222.1618	222-1618	0.3298
4.00	60.5	60.51 0.0130		4.00	1.00	12.56	4.81	0.3600	0.3600 222.1316 222.4917	222.4917	0.3298
ERTIES L	FLOW PROPERTIES UPSTREAM OF SECTION 132	SECTION	132	AT	AT STATION	69+20.98	HITH	PIPE	PIPE FLOW		
4.00	60.5	60.51 0.0130		4.00	4.00 1.00	12.56	4.81	0.3600	0.3600 222.4615 222.8215	222.8215	0.3298
SIPHON SECTION 13	132 BETWEEN STATION 69+20.98 AND	+69 NOITA	20.98		STATION 71+45.98	+45.98					
2.2	2.2500 FT. DIAMETER INVERTED SIPHONS IN PARALLEL. FLOW PROPERTIES IN EACH PIPE AS BELOW &	ER INVERTE	OHAIS G	NS IN PAR	ALLEL. F	LOW PROPE	RTIES IN	EACH PIP	E AS BELO	3 .	
2.25	30.25	ç		2.25	2.25 0.56	3.97	7.60	0.6990			3.4840
ERTIES L	FLOW PROPERTIES UPSTREAM OF SIPHON SECTION	SIPHON SE	CTION	132 AT	132 AT STATION	71+45.98	HITH !	PIPE	PIPE FLOW		
4.00	19-09			4.00	4.00	12.56	4.81	0.3600	0.3600 225.9455 226.3056	226.3056	3.4840

TABLE D-3 (CONTINUED) OUTPUT FROM INTERCEPTOR MODELING EXAMPLE

					00000-0-		0.0812	
	46.02 F				- 550: 905			
	MENT .			FLOW	225.9455 2	FLOW	226.0267	
	H OF SEG			P1PE	0.3600		0.3600	
	LENGT			WITH	4.81	HITH	4.81	
92.00	- "			71+45.98	12.56	71+92.00	12.56	195.00
11 NO 71	SEGMENTS			STATION	1.00	STATION	1.00	BETWEEN STATION 71+92.00 AND STATION 79+82.00
ND ST.	NO. OF		2	AT	**00	AT.	4.00	ND ST
45.98 A	69800	7N =	0.00421	132		132		92.00 A
710N 71+	0.0	OR PIPE	ope sc =	SECTION	0.0130	SECTION	0.0130	110N 71+
EEN STA	SLOPE	CONDUIT ITY OFUL	TICAL SL	AM 0F	60.51	OF	60.51	EEN STA
BET	02 FT.	IANNEL .	THAN CRI	DOWNSTRE		UPSTREAM		BET
32		PIPE FU	PE LESS	ERTIES	4.00	ERTIES	4.00	32
SECTION 1	LENGTH =	NORMAL DEF	BOTTOM SLO	FLOW PROP	211.53	FLOW PROF	211.57	SECTION 132
	MEEN STATION 71+45.98 AND STATION 71+92.00	132 BETWEEN STATION 71+45,98 AND STATION 71+92+00 = 46.02 FT. SLOPE = 0.000869 NO. OF SEGMENTS = 1 LENGTH OF SEGMENT = 46.02 F	132 BETWEEN STATION 71+45.98 AND STATION 71+92.00 = 46.02 FT. SLOPE = 0.000869 NO. OF SEGMENTS = 1 LENGTH OF SEGMENT = 46.02 F  ORPHIN CHANNEL, CONDUIT, OR PIPE YN = 4.0000 FT.	40 STATION 71+92.00 NO. OF SEGMENTS = 1 LENGTH OF SEGMENT = 46.02 F 4.0000 FT.	40 STATION 71+92.00 NO. OF SEGMENTS = 1 LENGTH OF SEGMENT = 46.02 F 4.0000 FT. AT STATION 71+45.98 WITH PIPE FLOW	40 STATION 71+92.00  NO. OF SEGMENTS = 1 LENGTH OF SEGMENT = 46.02 F  4.0000 FT.  AT STATION 71+45.98 WITH PIPE FLOW  4.00 1.00 12.56 4.81 0.3600 225.9455 226.3055 -	40 STATION 71+92.00 NO. OF SEGMENTS = 1 LENGTH OF SEGMENT = 46.02 F 4.0000 FT.  AT STATION 71+45.98 WITH PIPE FLOW 4.00 1.00 12.56 4.81 0.3600 225.9455 226.3055 - AT STATION 71+92.00 WITH PIPE FLOW	40 STATION 71+92.00 NO. OF SEGMENTS = 1 LENGTH OF SEGMENT = 46.02 F 4.0000 FT. AT STATION 71+45.98 WITH PIPE FLOW 4.00 1.00 12.56 4.81 0.3600 225.9455 226.3055 - AT STATION 71+92.00 WITH PIPE FLOW 4.00 1.00 12.56 4.81 0.3600 225.026.3867

TABLE D-3 (CONTINUED) OUTPUT FROM INTERCEPTOR MODELING EXAMPLE

HEAD LOSS FT.**	FT.				-0.0000	0.3486	0.3486	0.3486		0.3486
ENERGY GRADE ELE.FT.	= 197.50 FT.				226.3867	226.7353	227.0839	227.4325		227.7811
FLOW MANNING LOSS DEPTH HYDRA. FLOW VELOCITY VELOCITY WATER ENERGY HEAD  CPS. COEF. COEF. OF FLOW RADIUS AREA FPS. HEAD SURFACE GRADE  CPS. COEF. COEF. FLOW RADIUS AREA  T. SO.FT. FT. SO.FT. FT. FT. FT. FT. FT. FT. FT. FT. FT.	LENGTH OF SEGMENT =			WITH PIPE FLOW	0.3600 226.0267 226.3867 -0.0000	0.3600 226.3753 226.7353	0.3600 226.7239 227.0839	0.3600 227.0725 227.4325	PIPE FLOW	0.3600 227.4211 227.7811
/ELOC1T HEAD FT.	1 OF SE			-3dId	0.3600	0.3600	0.3600	0.3600	PIPE-	0.3600
ELOCITY FPS.	LENGT			WITH	4.81	4.81	4.81	4.81	WI TH	4.81
FLOW AREA SOFTT.	4			71+92.00	12.56	12.56	12.56	12.56	79+82.00	12.56
HYDRA. RADIUS FT.	NO. OF SEGMENTS	FT.		AT STATION 71+92.00	4.00 1.00 12.56	4.00 1.00 12.56	4.00 1.00	4.00 1.00	AT STATION 79+82.00	4.00 1.00 12.56 4.81
AANNING LOSS DEPTH HYDRA. COEF. COEF. OF FLOW RADIUS F1.************************************	NO. OF	4.0000 FT.	2		4.00	4.00	4.00	4.00	AT	4.00
LOSS COEF.	00670	7.26 CFS	0.00421	132					132	
MANNING COEF	SLOPE = 0.000670	OR PIPE	= SC =	ECTION	60.51 0.0130	60.51 0.0130	60.51 0.0130	60.51 0.0130	ECTION	60.51 0.0130
FLOW CFS.	SLOPE	TY OFULL	TICAL SLO	PROPERTIES DOWNSTREAM OF SECTION 132	60.51	60.51	60.51	60.51	30	60.51
SIDE SLOPE HR/VI	790.00 FT.	L CAPACI	THAN CRIT	OWNSTREA					JPSTREAM-	
B. WIDTH OR DIAM. FT.	790.0	H IN CHA	E LESS 1	RTIES	4.00	4.00	4.00	4.00	RTIES L	4.00
INVERT B. WIDTH SIDE ELEV. ON DIAM. SLOPE FT. FT. HR/VI	LENGTH =	NORMAL DEPTH IN CHANNEL . CONDUIT . OF PIPE YN = CONDUIT OF PIPE FULL CAPACITY OFULL = 37.26 CFS	BOTTOM SLOPE LESS THAN CRITICAL SLOPE SC = 0.004212	FLOW PROPE	220.47	220.60	220.73	250.80	FLOW PROPERTIES UPSTREAM OF SECTION 132	00.000

STATION 104+80.7

TABLE D-3 (CONTINUED) OUTPUT FROM INTERCEPTOR MODELING EXAMPLE

HEAD LOSS FT	÷					0.3377	0.4707	0.3537	0.3259	0.3351	0.3596	0.3675	0.3675	0.3675	0.3675	*****
ENERGY GRADE ELE.FT.	208.22 FT.					228-1188	228.5896	228.9433	259.5693	559.6044	559.9640	30.3315	0669.083	31.0665	131.4341	*********
WATER SURFACE ELE.FT.	SMENT			EL- FLOW		0.6977 227.4211 228.1188	0.4797 228.1099 228.5896	0.4143 228.5289 228.9433	0.3837 228.8855 229.2693	0.3645 229.2398 229.6044	0.3600 229.6039 229.9640	0.3600 229.9714 230.3315	0.3600 230.3390 230.6990	0.3600 230.7065 231.0665	0.3600 231.0740 231.4341	**************************************
VELOCITY HEAD FT	LENGTH OF SEGMENT			WITH CHANNEL- FLOW		0.6977	0.4797	0.4143	0.3837	0.3645	0.3600	0.3600	0.3600	0.3600	0.3600	******
VELOCITY VELOCITY FPS. HEAD FT.	LENG					6.70	5.55	5.16	4.97	4.84	4.81	4.81	4.81	4.81	4.81	******
FLOW VELOCITY VELOCI AREA FPS. HEAD SO.FT.				AT STATION 79+82.00	2.3410 FT.	8.05	10.88	11.71	12-17	12.48	12.56	12.56	12.56	12.56	12.56	*******
HYDRA. RADIUS FT.	NO. OF SEGMENTS	FT.		STATION		1.16	1.21	1.19	1.16	1.04	1.00	1.00	1.00	1.00	1.00	********
	NO. OF	4.0000 FT.	12	AT	ND LARGER THAN CRITICAL DEPTH , YC =	2.70	3.24	3.52	3.73	3.94	4.00	4.00	4.00	4.00	4.00	*******
LOSS COEF.	0.000692	7.86 CF	0.0042	32	ITTICAL (											******
MANNING COEF	0	OR PIPE	PE SC =	ECTION 1	THAN CA	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	
FLOW CFS.		CONDUIT , OR PIPE YN =	TICAL SLOPE SC = 0.004212	AM OF SECTION 132	ID LARGER	60.51	60.51	60.51	60.51	60.51	60.51	60.51	60.51	60.51	60.51	
		CAPACI	HAN CRIT	OWNSTREA	TREAM EN											
B. WIDTH OR DIAM. FT.	2498.73 FT.	PIPE FUL	E LESS 1	PROPERTIES DOWNSTRE	AT DOWNS	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	
INVERT B. WIDTH SIDE ELEV. OR DIAM. SLOPE FT. FT. HR/VI	LENGTH =	CONDUIT OR PIPE FULL CAPAC	BOTTOM SLOPE LESS THAN CRI	FLCW PROPE	FLOW DEPTH AT DOWNSTREAM E	224.72	224.86	\$25.00	\$25.15	225.29	225.44	855.58	225.72	225.87	226.01	

TABLE D-3 (CONTINUED) OUTPUT FROM INTERCEPTOR MODELING EXAMPLE

ELEV.	OR DIAM.		CFS.	COEF. COEF.	COEF	OF FLOW		AREA SO.FT.	FPS.	FPS. HEAD	SURFACE ELE. FT.	GRADE	LOSS
***************************************	日本市市市市市市市市市市市市市市市市市市市市市市市市市市市市市市市市市市市市		*****	**********	*	李老李为李本本本本本本本本本本本本本本本本本本本本本本本本本本本本本本本本本本	1.00	12.56	4.81	•	231.4415	2 4	ď
01.022	00.4		60.51	60-51 0-0130		4.00		12.56	4.81		231.8091	0.3600 231.8091 232.1691	0.3675
FLOW PRO	FLOW PROPERTIES UPSTREAM OF SECTION 132	STREAM-	OF S	SECTION 1	32	AT	AT STATION 104+80.7	104+80.7	HITH	P1PE	PIPE FLOW		
226.44	00.4		60.51	60.51 0.0130		4.00	4.00 1.00 12.56	12.56	4.81	0.3600	232.1766	0.3600 232.1766 232.5366	0.3675
SECTION	1338	BETWE	WEEN STATION	+0 NOIL	00.00+0	AND ST	STATION 17+27.53	127.53					
LENGTH	= 1727.53 FT.	FT.	SLOPE	SLOPE = 0.000688	88900	NO. OF	NO. OF SEGMENTS	6 11	LENGI	LENGTH OF SEGMENT	MENT =	191.94 FT.	FT.
NORMAL DE	NORMAL DEPTH IN CHANNEL , CONDUIT , OR PIPE YN = CONDUIT OR PIPE FULL CAPACITY GFULL = 37.75 CFS	NEL . C	ONDUIT .	. OR PIPE	7.75 CF	4.0000 FT.							
BOTTOM SL	BOTTOM SLOPE LESS THAN CRITICAL SLOPE SC = 0.004212	AN CRIT	ICAL SLC	SPE SC =	0.0042	112							
FLOW PRO	FLOW PROPERTIES DOWNSTREAM OF SECTION 1338	WNSTREA	M OF S	SECTION	1338		AT STATION	0+00 • 00	WITH		PIPE FLOW		
226.45	00.4		60.51	60.51 0.0130		4.00	4.00 1.00	12.56	4.81	0.3600	232.1766	0.3600 232.1766 232.5366	-0.0000
226.58	4.00		60.51	60.51 0.0130		4.00	1.00	12.56	4.81	0.3600	232.5153	0.3600 232.5153 232.8754	0.3388
226.71	00.4		60.51	60.51 0.0130		4.00	1.00	12.56	4.81	0.3600	232.8541	0.3600 232.8541 233.2142	0.3388
226.84	4.00		60.51	60.51 0.0130		4.00	1.00	12.56	4.81	0.3600	233.1929	0.3600 233.1929 233.5529	0.3388
226.97	4.00		60.51	60.51 0.0130		4.00	1.00	12.56	4.81	0.3600	233.5317	0.3600 233.5317 233.8917	0.3388

TABLE D-3 (CONTINUED) OUTPUT FROM INTERCEPTOR MODELING EXAMPLE

ELEV.	OR DIAM.	SIDE FI SLOPE CR HR/VI	FS.	MANNING COEF.	LOSS COEF.	DEPTH OF FLOW FT.	HYDRA. RADIUS FT.	FLOW AREA SQ.FT.	VELOCITY FPS.	VELOCITY HEAD FT.	WATER SURFACE ELE. FT	FLOW MANNING LOSS DEPTH HYDRA, FLOW VELOCITY VELOCITY WATER ENERGY E CFS. COEF. COEF. OF FLOW RADIUS AREA FPS. HEAD SURFACE GRADE T SO.FT. FT. ELE.FT.	HEAD LOSS FT
227.11	00.4		60.51	60.51 0.0130		00.4	4.00 1.00	12.56	4.81	0.3600	233.8704	0.3600 233.8704 234.2305	0.3388
227.24	4.00		60.51	60.51 0.0130		4.00	1.00	12.56	4.81	0.3600	234.2092	0.3600 234.2092 234.5693	0.3388
227.37	4.00		15.09	60.51 0.0130		4.00	1.00	12.56	4.81	0.3600	234.5480	0.3600 234.5480 234.9080	0.3388
227.50	4.00		60.51	60.51 0.0130		4.00	1.00	12.56	4.81	0.3600	234.8868	0.3600 234.8868 235.2468	0.3388
FLOW PR	FLOW PROPERTIES UPSTREAM OF SECTION 1338	STREAM	- OF S	ECTION	1338	14	STATION	AT STATION 17+27.53	WITH		PIPE FLOW		
227.63	4.00		15.09	60.51 0.0130		4.00	4.00 1.00 12.56	12.56	4.81		235.2255	0.3600 235.2255 235.5856	0.3388
CONTRACT	CONTRACTION SEC. 1338 BETWEEN STATION 17+27.53 AND	BETWEEN	STAT	10N 174	27.53		STATION 17+27.53	+27.53					
FLOW PR	FLOW PROPERTIES UPSTREAM OF CONTRACTION SEC.1338 AT STATION 17+27.53	STREAM	- 0F C	ONTRACT	ION SEC.	1338 AT	STATION	17+27-53	HITH		PIPE FLOW		
227.64	4.31		60.51		0.500	4.31	0.500 4.31 1.07 14.58	14.58	*11*	0.2671	235.4984	4.14 0.2671 235.4984 235.7655	0.1800
SECTION 1338	1338	BETWEEN	STAT	10N 174	27.53	AND ST	BETWEEN STATION 17+27.53 AND STATION 72+13.01	+13.01					

TABLE D-3 (CONTINUED) OUTPUT FROM INTERCEPTOR MODELING EXAMPLE

HE FE	FT.				-0.0000	0.2408	0.2408	0.2408	0.2408	0.2408	0.2408	0.2408	0.2408	0.2408	0.2408	
ENERGY GRADE ELE. • FT.	203.16 FT.					236.0063	236-2471	236.4880	236-7288	3696.988	237-2104	237.4512	237-6920	237.9328	238-1737	在水井水水水水水水水水水水水水水水水水水水水水水水水水水水水水水水水水水水水水
* * * * * * * * * * * * * * * * * * *	MENT			PIPE FLOW	0.2671 235.4984 235.7655	0.2671 235.7392 236.0063	0.2671 235.9800 236.2471	0.2671 236.2208 236.4880	0.2671 236.4617 236.7288	0.2671 236.7025 236.9696	0.2671 236.9433 237.2104	0.2671 237-1841 237-4512	0.2671 237.4249 237.6920	0.2671 237.6657 237.9328	0.2671 237.9065 238.1737	*********
VELOCITY HEAD FT.	LENGTH OF SEGMENT			P1PE	0.2671	0.2671	0.2671	0.2671	0.2671	0.2671	0.2671	0.2671	0.2671	0.2671	0.2671	
**************************************	LENGT			WITH	4.14	4.14	4.14	4.14	4.14	4.14	4.14	4.14	4.14	4.14	4.14	*******
* FLO * * * * * * * * * * * * * * * * * * *	= 27			17+27.53	14.58	14.58	14.58	14.55	14.58	14.58	14.58	14.58	14.58	14.58	14.58	******
**************************************	NO. OF SEGMENTS	FT.		AT STATION	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	*****
**************************************	NO. OF	4.3100 FT.	32	AT	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	******
LOSS COEF.	069000	16.14 CF	0.003982	1338												******
**************************************	06900000 =	CONDUIT , OR PIPE YN =	TICAL SLOPE SC =	AM OF SECTION	60.51 0.0130	60.51 0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	60.51 0.0130	*******
FLOW CFS.	SLOPE	TY OFULL	TICAL SL	AM OF	15.09	19.09	60.51	60.51	60.51	60.51	60.51	60.51	60.51	19.09	60.51	******
		ANNEL .	THAN CRI	DOWNSTRE												*
B. *IDTH OR UIAM.	5485.	TH IN CH	PE LESS	PROPERTIES DOWNSTRE	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	*******
INVERT B. #10TH SIDE ELZV. OR OIAM. SLOPE FT. HANNING STANING	LENGTH =	CONDUIT OR PIPE FULL CAPAC	BOTTOM SLOPE LESS THAN CRI	FLOW PROP	227.64	227.78	227.92	224.06	228.20	228.34	228.48	228.62	228.76	228.90	229.04	***************

TABLE D-3 (CONTINUED) OUTPUT FROM INTERCEPTOR MODELING EXAMPLE

LOSS	0.2408	0.2408	0.2408	0.2408	0.2408	0.2408	0.2408	0.2408	0.2408	0.2408	0.2408	0.2408	0.2408	0.2408	0.2408	0.2408	
******** ENERGY GRADE ELEFT.		238.6553	238.8961	239.1369	239.3777	239-6185	239.8594	240.1002	240.3410	240.5818	240.8226	241.0634	241.3042	241.5451	241.7859	242.0267	:
****** WATER SURFACE ELEFT.	0.2671 238.1474 238.4145	0.2671 238.3882 238.6553	0.2671 238.6290 238.8961	238.8698	239.1106	239.3514	239.5925	239.8330	0.2671 240.0739 240.3410	0.2671 240.3147 240.5818	0.2671 240.5555 240.8226	240.7963	241.0371	241.2779	241.5187	0.2671 241.7596	****************
VELOCITY HEAD FT.	0.2671	0.2671	0.2671	0.2671	0.2671	0.2671	0.2671	0.2671	0.2671	0.2671	0.2671	0.2671	0.2671	0.2671	0.2671	0.2671	*******
**************************************	4.14	4.14	4.14	4.14	4.14	4.14	4.14	4.14	4.14	4.14	4.14	4.14	4.14	4.14	4.14	4.14	********
FLOW AREA SQ.FT.	14.58	14.58	14.58	14.58	14.58	14.58	14.58	14.58	14.58	14.58	14.58	14.58	14.58	14.58	14.58	14.58	********
HYDRA. RADIUS FT.	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	********
DEPTH OF FLOW FT	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	*******
LOSS COEF.																	*****
* 5 * * * * * * * * * * * * * * * * * *	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	
FLO CFS.	60.51	60.51	60.51	60.51	60.51	60.51	60.51	60.51	60.51	60.51	60.51	60.51	60.51	60.51	60.51	60.51	******
SLOPE SLOPE HR/VT																	
INVERT B. WIDTH SIDE LEV. OR DIAM. SLOPE FT. FT. HR/V	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31	*****************
INVERT	229.18	229.32	229.46	229.60	229.74	229.88	230.02	230.16	230.30	230.44	230.58	230.72	230.86	231.00	231.14	231.28	

TABLE D-3 (CONTINUED) OUTPUT FROM INTERCEPTOR MODELING EXAMPLE

ELC.V.	OR DIAM.	SLOPE HR/VI	CFS.	MANN COMPING COMPING	COEF.	DEPTH OF FLOW FT.	RADIUS FT.	AREA SO.FT.	FPS. HEAD	- 1	SURFACE ELE. FT.	GRADE ELE. FT.	LOSS
FLOW PROF	PERTIES	李安本太祖和李安安安安安安安安安安安安安安安安安安安安安安安安安安安安安安安安安安安安	******	**********	1338	AT AT	在李志寺中央中央中央中央中央中央中央中央中央中央中央中央市会市市市市市市市市市市市市市	72+13-01 WITH PIPE-	HLIM	. 1	PIPE FLOW		
231.42	4.31		60.51	60.51 0.0130		4.31	4.31 1.07	14.58	4.14	0.2671 2	0.2671 242.0004 242.2675	142.2675	0.2408
SECTION	1338	BETWE	EN STA	TION 72+	13.01	AND ST	BETWEEN STATION 72+13.01 AND STATION 96+24.71	+24.71					
LENGTH :	= 2411.70 FT.	.70 FT.	SLOPE	SLOPE = 0.000543	100543	NO. OF	NO. OF SEGMENTS = 12	= 12	LENGI	LENGTH OF SEGMENT	MENT .	200.97 FT.	FT.
IAL DEF	PIPE F	NORMAL DEPTH IN CHANNEL , CONDUIT , OR PIPE YN =	ONDUIT TY OFULL	. OR PIPE	VN =	4.3100 FT.	FT.						
OM SEC	DPE LESS	BOTTOM SLOPE LESS THAN CRITICAL SLOPE SC =	ICAL SL	OPE SC =	0.003982	82							
FLOW PROF	PERTIES	PROPERTIES DOWNSTREAM OF SECTION	M 0F	SECTION	1338	AT		STATION 72+13.01	WITH	PIPE	PIPE FLOW		
231.42	4.31		60.51	60.51 0.0130		4.31	4.31 1.07	14.58	4.14	0.2671 2	0.2671 242.0004 242.2675		-0.0000
231.53	4.31		60.51	60.51 0.0130		4.31	1.07	14.58	4.14	0.2671 2	0.2671 242.2386 242.5057	142.5057	0.2382
231.64	4.31	-	19.09	00.01 0.0130		4.31	1.07	14.58	4.14	0.2671	0.2671 242.4768 242.7439	242-7439	0.2382
231.75	4.31		60.51	0.0130		4.31	1.07	14.58	4.14	0.2671	0.2671 242.7150 242.9821	142.9821	0.2382
231.86	4.31		60.51			4.31	1.07	14.58	4.14	0.2671 2	0.2671 242.9532 243.2203	143.2203	0.2382
231.97	4.31	•	60.51	0.0130		4.31	1.07	14.58	4.14	0.2671 2	0.2671 243.1914 243.4586	143.4586	0.2382
232.07	4.31		60.51	60.51 0.0130		4.31	1.07	14.58	4.14	0.2671	0.2671 243.4297 243.6968	843.6968	0.2382

TABLE D-3 (CONTINUED) OUTPUT FROM INTERCEPTOR MODELING EXAMPLE

ELEV.	B. WIDTH OR DIAM.	SLOP SLOP HR/V	FLOW CFS.	MANNING LOSS COEF. COEF.	COEF.	OF FLOW RADIUS	RADIUS FT.	FLOW AREA SQ.FT.	VELOCITY FPS.	FPS. HEAD SURFACE FT. ELE. FT.	WATER SURFACE ELE. FT.	ENERGY GRADE ELE. FT.	LOSS LOSS
232.18 4.31	4.31		60.51	60.51 0.0130		4.31	1.07	14.58	4.14 0.267	4.14 0.2671 243.6679 243.9350	243.6679	243.9350	0.2382
232.29	4.31		60.51	60.51 0.0130		4.31	1.07	14.58	4.14	0.2671	0.2671 243.9061 244.1732	244.1732	0.2382
232.40	4.31		15.39	0.0130		4.31	1.07	14.58	4.14	0.2671	0.2671 244.1443 244.4114	244.4114	0.2382
232.51	4.31		60.51	60.51 0.0130		4.31	1.07	14.58	4.14	0.2671	0.2671 244.3825 244.6497	244.6497	0.2382
232.62	4.31		60.51	60.51 0.0130		4.31	1.07	14.58	4.14	0.2671	0.2671 244.6208 244.8879	244.8879	0.2382
FLOW PROPERTIES UPSTREAM OF SECTION 1338	RTIES UP	STREAM	OF S	SECTION	1338	AT.	STATION	96+24.71	WITH	PIPE	PIPE FLOW		
232.73	4.31		60.51	60.51 0.0130		4.31	4.31 1.07	14.58	4.14	0.2671	0.2671 244.8590 245.1261	245-1261	0.2382
EXPANSION	SEC.1338 BETWEEN STATION 96+24.71 AND	BETWEE	IN STAT	10N 96+	24.71		STATION 96+24.71	1+24.71					
FLOW PROPERTIES UPSTREAM OF EXPANSION SEC.1338 AT STATION 96+24.71	RTIES UP	STREAM	OF E	XPANS I ON	SEC.	1338 AT	STATION	96+24.71	WITH	PIPE	PIPE FLOW		
232.74	3.50		60.51		1.000	1.000 3.50 0.87 9.62	0.87	9.62	6.28	0.6142	245.1260	6.28 0.6142 245.1260 245.7403	0.6142

TABLE D-3 (CONTINUED) OUTPUT FROM INTERCEPTOR MODELING EXAMPLE

INVERT ELEV. FT.	es R	INVERT 6. WIDTH SIDE ELEV. OR DIAM. SLOPE FT. RAYLES	SLOPE SLOPE HR/VT	FLOW CFS.	MANNING COMPIN	MANNING LOSS COEF. COEF.	DEPTH OF FLOW FT.	HYDRA. RADIUS FT.	FLOW AREA SQ.FT.	FLOW VELOCITY VELOCITY WATER AREA FPS. HEAD SURFACE SQ.FT. FLE.FT. ***********************************	HEAD FT.	WATER SURFACE SLEFT.	ENERGY HEAD GRADE LOSS ELE.*FT. FT.	HEAD LOSS FT.
LENGTH	"	465.29 FT.	FT.	SLOPE		- 0.000687	NO. OF	NO. OF SEGMENTS		LENGT	LENGTH OF SEGMENT	" LN	232.64 FT.	FT.
MAL DE	PTH N	IN CHAN	CAPACI	ONDUIT TY OFULI	. OR PIP	NORMAL DEPTH IN CHANNEL , CONDUIT , OR PIPE YN = CONDUIT OR PIPE FULL CAPACITY OFULL = 26.42 CFS	3.5000 FT.	FT.						
TTOM SL	OPE I	LESS TH	AN CRIT	ICAL SL	UPE SC =	BOTTOM SLOPE LESS THAN CRITICAL SLUPE SC = 0.005205	90							
DW PRO	PERT	IES DO	WNSTREA	M 0F	FLOW PROPERTIES DOWNSTREAM OF SECTION 1338	1338	AT	AT STATION 96+24.71	96+24.71		WITH PIPE FLOW	- FLOW		
232.74		3.50		60.51	60.51 0.0130		3.50	3.50 0.87	9.62	6.28	0.6142 24	15.1260 2	0.6142 245.1260 245.7402 -0.0000	-0.0000
232.89		3.50		60.51	60.51 0.0130		3.50	3.50 0.87	9.62	6.28	0.6142 245.9630 246.5773	15.9630 2	46.5773	0.8370
PRG PRG	PERT	IES UP	STREAM	OF	FLOW PROPERTIES UPSTREAM OF SECTION 1338	1338	AT	AT STATION 100+90.0	100+90.0	WITH	PIPE FLOW	- FLOW		
233.05		3.50		60.51	60.51 0.0130		3.50	3.50 0.87	9.62	6.28	0.6142 24	0.6142 246.8000 247.4143	47.4143	0.8370
TRACT!	ON SE	EC.1338	BETWE	EN STA	TI 0N 10	CONTRACTION SEC.133B BETWEEN STATION 100+90.0 AND		STATION 100+90.0	0.06+0					
DAY PRO	PERT	IES UP	STREAM-	OF	CONTRACT	ION SEC.	1338 AT	FLOW PROPERTIES UPSTREAM OF CONTRACTION SEC. 1338 AT STATION 100+90.0	100+90.0		WITH PIPE FLOW	- FLOW		
233.06		4.00		47.99		0.500	4.00	0.500 4.00 1.00 12.56	12.56	3.81	3.81 0.2264 247.4949 247.7213	2 64640 2	47.7213	0.3071

BETWEEN STATION 100+90.0 AND STATION 130+87.5

TABLE D-3 (CONTINUED) OUTPUT FROM INTERCEPTOR MODELING EXAMPLE

ELEV.	ELEV. OR DIAM. SLOP	SLOPE HR/VT	CFS.	COEF	COEF.	FLOW MANNING LOSS DEPTH HYDRA. E CFS. COEF. OF FLOW RADIUS		AREA SQ.FT.	AREA FPS. HEAD	HEAD FT.	SURFACE ELE.FT	GRADE GRADE ELE.FT.	LOSS
LENGTH	= 2997.57 FT.	7 FT.	SLOPE	069000 =	06900	NO. OF	NO. OF SEGMENTS		LENGTH	LENGTH OF SEGMENT	MENT =	199.83 FT.	ŗ.
NORMAL DE	NORMAL DEPTH IN CHANNEL , CONDUIT , OR PIPE YN = CONDUIT OF PIPE FULL CAPACITY GFULL = 37.81 CFS	NNEL . CC	NADUIT .	OR PIPE	7.81 CFS	4.0000 FT.	.1.						
BOTTOM SL	BOTTOM SLOPE LESS THAN CRITICAL SLOPE SC = 0.004009	HAN CRITI	CAL SLO	PE SC =	0.00400	. 60							
FLOW PROPERTIES	PERTIES DO	DOWNSTREAM OF SECTION	1 OF S		1338	TV	STATION	100+90.0	WITH	PIPE	PIPE FLOW		
233.06	4.00		47.99	47.99 0.0130		4.00	1.00	12.56	3.81	0.2264	247.4949	0.2264 247.4949 247.7213	-0.0000
233.19	4.00		47.99	0.0130		4.00	1.00	12.56	3.81	0.2264	247.7167	0.2264 247.7167 247.9432	0.2218
233.33	4.00		47.99	0.0130		4.00	1.00	12.56	3.81	0.2264	247.9385	0.2264 247.9385 248.1650	0.2218
233.47	00.4		47.99	0.0130		4.00	1.00	12.56	3.81	0.2264	248.1604	0.2264 248.1604 248.3869	0.2218
233.61	4.00		47.99	0.0130		4.00	1.00	12.56	3.81	0.2264	0.2264 248.3823 248.6087	248.6087	0.2218
233.74	4.00		47.99	0.0130		4.00	1.00	12.56	3.81	0.2264	248.6041	0.2264 248.6041 248.8306	0.2218
233.88	4.00		47.99	0.0130		4.00	1.00	12.56	3.81	0.2264	248.8260	0.2264 248.8260 249.0525	0.2218
234.02	4.00		47.99	0.0130		4.00	1.00	12.56	3.81	0.2264	0.2264 249.0479 249.2743	249.2743	0.2218
234.16	00.4		47.99	0.0130		4.00	1.00	12.56	3.81	0.2264	249.2697	0.2264 249.2697 249.4962	0.2218
234.30	4.00		47.99	0.0130		4.00	1.00	12.56	3.81	0.2264	0.2264 249.4916 249.7181	249.7181	0.2218
234.43	00.4		47.99	0.0130		4.00	1.00	12.56	3.81	0.2264	249.7135	0.2264 249.7135 249.9399	0.2218

TABLE D-3 (CONTINUED) OUTPUT FROM INTERCEPTOR MODELING EXAMPLE

******	*******	********	******	*********	******	********	*******	********	********	*********	******	***************************************	*****
INVERT	B. WIDTH	SID	FLOW	MANNING	COFF	DEPTH OF FLOW	HYDRA.	FLOW	VELOCITY FPS.	VELOCITY	SURFACE	DE CES. COFF. COFF. OF FLOW RADIUS AREA FPS. HEAD SURFACE GRADE	LOSS
FT.	FT.	HRIVI		z		FT	FT	SQ.FT.		F.T.	ELE. FT.	ELE. FT.	
*****	******	******	*****										
234.57	4.00		47.9	47.99 0.0130		4.00	4.00 1.00 12.56	12.56	3.81	3.81 0.2264 249.9353 250.1618	549.9353	250.1618	0.2218
234.71	4.00		47.9	47.99 0.0130		4.00	1.00	12.56	3.81	0.2264 2	0.2264 250.1572 250.3836	250.3836	0.2218
234.85	4.00		47.9	47.99 0.0130		4.00	1.00	12.56	3.81	0.2264	0.2264 250.3790 250.6055	250.6055	0.2218
234.99	4.00		47.99	47.99 0.0130		4.00	1.00	12.56	3.81	0.2264 2	0.2264 250.6009 250.8274	250.8274	0.2218
FLOW PR	FLOW PROPERTIES UPSTREAM OF SECTION 1338	UPSTREAM-	OF	SECTION	1338	AT	STATION	AT STATION 130+87.5		WITH PIPE FLOW	FLOW		
235.12	4.00		47.9	47.99 0.0130		4.00	4.00 1.00 12.56	12.56	3.81	3.81 0.2264 250.8228 251.0492	250.8228	251.0492	0.2218

APPENDIX E

PUMPING STATION AND HEADWORKS INVENTORY ABBREVIATIONS

NOTE: This appendix to Technical Data Vol. 9 has not been included in all copies of the report due to the nature and length of its content. However, in order to acquaint the reader with its content the first sheet of the abbreviation is included. A copy of the abbreviations and inventories is available for review at the Metropolitan District Commission, 20 Somerset Street, Boston, Mass.

# APPENDIX E

# PUMPING STATION AND HEADWORKS INVENTORY ABBREVIATIONS

The following abbreviations were used during the inventory of the pumping station and headworks facilities and appear in Appendixes F and G.

# INVENTORY ABBREVIATIONS

Amperes or Amber (Indicating light)
American Gear Manufacturers Association

AGMA.

Ambient (temperature) Amb.

Armature Arm. Auto. Automatic

BHP. Boiler horsepower

Centigrade (temperature) Cubic Feet per Minute C.

CFM.

Cont. Continuous

Des. Design

Diameter Dia.

Diff. Differential

Disc. Disconnect

DP.

Discharge pressure Dripproof (Motor Enclosure) DP.

Dwg. Drawing

Elev. Elevation

Exp. Explosion

Ft. Feet

Forward Fwd.

#### APPENDIX F

# PUMPING STATION INVENTORY

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SECTION 1

ALEWIFE BROOK PUMPING STATION

Alewife Brook Pumping Station Power Distribution System

Location First floor

Power Supply From substation in rear of building

Boston

From Edison Co. Voltage 4,160 Phase 3

from two sources through an automatic transfer switch to the Power Transformers Quantity 2 Voltage 460 KVA 225

Manufacturer Westinghouse Taps 22

Other N.P. Data Transformers in locked yard are not accessible.

Condition Fair

Maintenance Comments Some deterioration of Boston Edison Co. equipment.

Switchgear Cabinetrol and Manufacturer G. E. and G&N Switchcontrol panel (MCC) gear Div.

Identification Trademarks Condition Good only

Main Breaker 600 A Westinghouse

Useable Spares or Spaces 4

Number of Structures 7 Space for Future Room for 5 more, if needed.

Other Information Remotely controlled automatic system not being used.

Maintenance Comments Very well maintained equipment. Where power enters basement wall, water enters pull box when raining, and requires cleaning of floor. Corrosion has set in.

# APPENDIX G

# HEADWORKS INVENTORY

NOTE: This appendix to Technical Data Vol. 9 has not been included on all copies of the report due to the nature and length of its content. However, in order to acquaint the reader with its contents the first sheet of the inventory is enclosed. A copy of the inventory is available for review at the Metropolitan District Commission, 20 Somerset Street, Boston, Mass.

SECTION 1
CHELSEA CREEK HEADWORKS

Chelsea Creek Headworks Power Distribution System

Location First Floor (Elev. 117.12')

Power Supply To common access transformer vault.

From Boston Edison Company Voltage 4160 Phase 3

Power Transformer Quantity Voltage KVA

Manufacturer Taps \$Z

Other N.P. Data

Key could not be located to obtain access.

No information available

Condition

Maintenance Comments

Switchgear Distribution Manufacturer Westinghouse

Switchboard

Identification None Condition Good

Main Breaker 1000 Date of Mfr.
1600 Unknown

Useable Spares or Spaces 7

Number of Structures 7

Other Information Boston Edison Metering on switchboard

Maintenance Comments

Several circuit breaker panel sections within this switchboard supply all of the building loads







